North American Waterfowl Management Plan
Plan nord-américain de gestion de la sauvagine
Plan de Manejo de Aves Acuáticas de Norteamérica

September 11, 2006

A message for stakeholders and others with an interest in the North American Waterfowl Management Plan: From the North American Waterfowl Management Plan Committee

The draft North American Waterfowl Management Plan Continental Progress Assessment Report (Plan Assessment) has just been released for public comment. An extensive review of the North American Waterfowl Management Plan (Plan), a primary recommendation of the 2004 Plan Update, was undertaken by the Plan Committee to mark 20 years of conservation achievement. An Assessment Steering Committee was seated in 2005 and charged to conduct the first comprehensive biological assessment of the Plan. Over the past 18 months hundreds of Plan partners including every joint venture and flyway council have been involved in this Plan Assessment.

We wish to acknowledge to diligent, professional, persistent, and at times tedious, work of the members of the Assessment Steering Committee. We also wish to thank the hundreds of partners for their extensive and thoughtful input over the past 18 months through formal written responses and interviews with each of the habitat and species joint ventures, written responses from each of the flyway councils and the Pintail Action Group, and meetings with the NAWMP Science Support Team and Joint Task Group on Plan Goals and Harvest Management. Collectively this represents the most comprehensive assessment in the history of the Plan. This report summarizes the findings and recommendations of that inquiry.

The Plan Committee will combine this report of the Assessment Steering Committee with stakeholder input in a final report of findings and recommendations. **To that end, we request your written comments on this draft report with particular attention to the merit, urgency, or relative priority of the recommendations contained in the report.** It is the intention of the Plan Committee to use these comments from stakeholders within the waterfowl community to set the future direction and priorities for the Plan.

Please provide your comments by November 17 to Rick Pratt, Canadian Wildlife Service <Richard.Pratt@ec.gc.ca> or Seth Mott, U.S. Fish and Wildlife Service <seth_mott@fws.gov>

NORTH AMERICAN WATERFOWL MANAGEMENT PLAN

CONTINENTAL PROGRESS ASSESSMENT

(DRAFT REPORT)

September 11, 2006

PREFACE

In 2005 we were asked by the Plan Committee of the North American Waterfowl Management Plan (Plan) to form an Assessment Steering Committee and to conduct the first continental biological assessment of the Plan in its 20 year history. This report summarizes our findings from that effort.

Our quest has been challenging, informative, and rewarding. Through our interviews, we learned that the Plan Community throughout the continent is very active on many fronts tackling important issues and conserving habitats in many key waterfowl areas for breeding, wintering, and migrational needs. While these efforts have cumulatively affected millions of acres since l986, much work remains to be done before Plan goals for waterfowl populations will be realized.

Our report contains several recommendations which we believe will move the entire Plan effort closer to attaining its continental waterfowl population goals. We strongly urge the Plan Committee to take these recommendations under advisement and to act on them prudently yet promptly. We were very impressed with the professionalism, expertise, and dedication of the many Plan partners. They are truly the backbone of the Plan and we are confident that they represent a highly competent force that is more than capable of acting upon the Plan Committee's leadership and guidance to implement their recommendations.

We were honored to have been nominated for this assignment and we thank the Plan Committee for their confidence in us. Without their support and the help of numerous support staff we would not have been able to complete our assignment.

Respectfully submitted,

The Assessment Steering Committee

Canada

Dr. Ken Abraham
Dr. Michael Anderson
Dr. Robert Clark
Mr. Lorne Colpitts
Dr. Eric Reed

United States

Mr. Richard Bishop
Dr. John Eadie
Dr. Mark Petrie
Dr. Frank Rohwer
Dr. Mike Tome

Mexico

Mr. Humberto Berlanga
Mr. Eduardo Carrera
Mr. Ariel Rojo

EXECUTIVE SUMMARY

1. Partners in the North American Waterfowl Management Plan (NAWMP [Plan]) marked 20 years of conservation achievement by conducting a broad assessment of progress towards achieving the Plan's biological goals and by recommending ways of improving program performance and institutional relationships.

2. An independent review team synthesized information acquired *via* written questionnaires, interviews and supporting materials provided by all habitat and species Joint Ventures (JVs), Flyway Councils, Mexico and the Pintail Action Group (PAG).

3. The Plan has been a cohesive force, bringing focus to waterfowl and wetland conservation and management efforts in North America. People in the waterfowl conservation community remain committed, are better organized, have greater coherence, and are getting more done than ever before. These are great strengths to build upon.

4. The JV coordination/organizational model stimulated an impressive amount of habitat conservation and innovative ways of delivering conservation programs. The Plan has influenced over 13 million acres of breeding, migration and wintering habitat in North America.

5. Notwithstanding these successes, improved methods of reliably tracking JV habitat accomplishments and estimating changes in areas of important upland and wetland habitat must be implemented to provide greater certainty about the overall net impact of the Plan on North American landscapes. Partners must also strive to develop better performance metrics that reflect the impacts of partner actions on waterfowl populations.

6. Given current and anticipated threats to wetlands and grasslands in the Prairie Pothole Region (PPR), and the importance of this region for many continental duck populations, including mallards and northern pintails, more resources, both Plan funds and other conventional waterfowl funds, must be directed toward this critical region if we are to achieve Plan goals for key duck populations.

7. Many waterfowl populations currently fluctuate near Plan objectives or in few cases are overabundant. Populations of northern pintail and lesser scaup remain well below objectives, and some sea duck populations have experienced substantial declines. Effects of harvest and natural environmental variation on waterfowl populations and, hence, on Plan goals require further consideration. A comprehensive review of Plan population and habitat objectives should be undertaken leading up to the next update of the Plan in 2009.

8. Our understanding of factors affecting several waterfowl populations has grown substantially and this knowledge is informing management decisions across the continent. Management programs implemented by habitat JVs may benefit waterfowl at local or regional scales, but assessing direct benefits of these actions becomes increasingly difficult at larger spatial scales.

9. Agricultural policies and programs that favor retention and improvements to grassland and wetland habitats over large areas of the prairies will be needed to achieve the Plan's population objectives for most species of dabbling and diving ducks. This has been recognized since the inception of the Plan, but such policy efforts will require substantially increased attention to maintain or achieve positive landscape changes in both Canada and the United States. Such programs must also be evaluated in order to improve their future effectiveness.

10. Several breeding and wintering ground JVs employ state-of-the-art, biologically-based planning tools and evaluation programs. However, further improvements are required in many other regions. Planning in all JVs should be built on strong biological foundations, their programs evaluated in a rigorous manner, and refined by adaptive management.

11. To improve Plan effectiveness, resources must be allocated in all JVs to monitoring and evaluation programs which are tightly aligned with management and policy actions. Continued Plan support, especially for habitat JVs, should be contingent on design and implementation of an evaluation strategy approved by the Plan Committee (PC).

12. Implementation of the National Strategy for the Management of Waterfowl and their Habitats in Mexico is an important priority and the logical next step in the development of effective waterfowl conservation in that country and, indeed, in North America.

13. Greater integration is required among ecologically linked JVs, the species JVs and their related habitat JVs, and at continental and regional scales.

14. JVs desire that the PC provide more effective leadership, enable better communication, and play a stronger role in advocating for the Plan and complementary policy developments. JVs also seek greater interaction and integration between themselves and the PC, the Flyways and an active, well-functioning NAWMP Science Support Team (NSST).

15. The PC should revitalize the NSST. In turn, the NSST should address several important challenges: linking landscape and environmental variation with demographic and population objectives; devising ways of measuring JV success on wintering and migration areas; and, determining how to step-down Plan population objectives to Flyway, regional and JV scales.

16. The PC should ensure development of a clearer and more robust accountability framework for the achievement of Plan biological objectives involving all organizational levels of the Plan Community. This will require enhanced two-way communication, coordination in setting objectives, enhanced monitoring and reporting, and improved performance metrics.

17. Most of the Plan Community viewed the assessment process as very positive and overdue, and such assessments should be repeated at regular intervals.

18. The PC and the JVs need to maintain a strong dialogue with the NAWC Councils and other Plan stakeholders around the needs of NAWMP. This should lead to both greater NAWCA impact on waterfowl populations and development of new resources to address key waterfowl conservation needs (e.g., public policy initiatives) that are not presently eligible for NAWCA support.

19. This report provides guidance on steps required to substantially improve the ability of Plan partners to set and measure habitat accomplishments and population goals, target conservation programs, foster program diversity, invest in monitoring and evaluation, and introduce progressive institutional changes.

TABLE OF CONTENTS

I. INTRODUCTION

A. EVOLUTION OF THE NORTH AMERICAN WATERFOWL MANAGEMENT PLAN

The North American Waterfowl Management Plan (Plan) was a bold and visionary challenge to wildlife managers. It was created during a time of prairie drought, diminishing habitats, and declining numbers of mid-continent ducks. Completed in 1986, the Plan fundamentally altered waterfowl habitat conservation in North America. The Plan established waterfowl population goals and included guiding principles and a framework for collective action. The continental scope was ambitious, but the Plan was remarkably successful at galvanizing action by a diverse coalition interested in restoring waterfowl populations. The Plan's greatest impact was to stimulate the formation of regional Joint Ventures (JVs) of public agencies and private organizations that came together to carry out the work envisioned by the Plan. The JVs then translated the Plan's population goals into regional habitat goals and set out to achieve them.

After only a year or two of habitat work it became clear that additional scientific understanding about waterfowl and habitat relationships was needed to help guide conservation actions. The first efforts in biological evaluation came at the JV level (e.g., Prairie Habitat Joint Venture [PHJV] [Nelson et al. 1989], Lower Mississippi Valley Joint Venture [LMVJV] [Loesch et al. 1994]) but Plan leaders soon realized that similar efforts to understand linkages between habitat actions and waterfowl population responses were needed at large spatial scales as well. So, between 1989 and 1991 Plan stakeholders worked to create a continental evaluation plan and a Continental Evaluation Team (CET) tasked with advancing evaluations at both continental and regional scales (Sharp et al. 1992).

B. PLAN UPDATES

One of the most astute provisions in the 1986 Plan was the commitment to review and revise the Plan every 5 years. Updates have kept the Plan relevant in a changing world. The first Update was completed in 1994 and featured three major changes: 1) Mexico joined Canada and the United States as a signatory partner in the Plan; 2) With the first experience of regional-scale planning behind them, most of the JVs greatly increased their estimates of how much conservation work would be required to achieve Plan goals; and, 3) The harvest regulation provisions in the original Plan were removed, largely in deference to the developing adaptive harvest management (AHM) framework in the United States. The 1994 Update was informed by a first accounting, conducted by the federal lead agencies, of NAWMP acreage accomplishments and expenditures (U.S. Fish and Wildlife Service and Canadian Wildlife Service 1993).

Leading up to the 1998 Update, the Plan Community undertook extensive discussions about the organization and delivery of "all-bird" conservation and whether or how the Plan should evolve to meet that challenge. Simultaneously, the CET undertook a first review of habitat accomplishments and the state of biological planning by JVs. Their findings were presented to the PC in a short series of unpublished reports and synthesized as a "Technical Companion Document" to the 1998 Update.

The 1998 Update advanced 3 complementary concepts that committed Plan partners to: 1) Define and attain the landscape conditions needed to sustain waterfowl numbers at Plan goals; 2) Forge broad alliances with other conservation efforts and communities to achieve Plan objectives; and, 3) Continually improve the biological foundations of waterfowl conservation through biologically based planning and ongoing evaluation. At the same time, the PC made it clear that the Plan was and would remain about waterfowl. Development of parallel plans for other bird groups would occur under different national or international coordinating bodies, while on-the-ground actions would be coordinated at the JV and local levels.

In 2004, this three-part vision was reinforced and summarized succinctly as a statement of Plan Purpose: **"The purpose of the Plan is to sustain abundant waterfowl populations by conserving landscapes, through partnerships, that are guided by sound science."**

Since the mid-1990s, Plan partners have focused increasing attention and resources on strengthening the biological foundations of the Plan (e.g., Anderson et al. 1996; Johnson et al. 1997; Williams et al 1999). This work consisted mainly of evaluations of key planning assumptions, assessments of individual conservation actions, and more rigorous model-based conservation planning. This was motivated by a growing need for biological accountability among Plan partners and the imperative of investing limited conservation dollars wisely. The PC took an important step to enhance scientific leadership by establishing the North American Waterfowl Management Plan Science Support Team (NSST) (Anderson et al. 1999), which acts as a technical support arm for the Plan Committee.

As planning for the 2004 Update began, Plan leaders concluded that strengthening biological foundations deserved greater attention, and that thus became the theme of the 2004 Update. The Update steering committee recognized that some of the vital foundations of the Plan (e.g., population goals and related habitat goals) were poorly understood in several areas. Moreover, progress with biological planning, monitoring and assessment was very uneven among JVs – some were working on a firm and expanding biological foundation but others had advanced little in this regard. At the continental scale there was no scientifically credible way to link Plan habitat accomplishments with changes in waterfowl populations. As a result, there were no really useful Plan performance metrics to assess the extent to which Plan actions were affecting waterfowl populations.

C. THE CALL FOR A COMPREHENSIVE ASSESSMENT

Nearing completion of the 2004 Update, the PC realized that it was vital to achieve a comprehensive assessment of Plan conservation accomplishments and ongoing needs. Previous efforts to report on the success of the Plan had consisted of tallies of acres conserved, dollars spent, comparisons of annual waterfowl survey results with Plan objectives, or regional assessments of JV accomplishments (e.g., U.S. Fish and Wildlife Service and Canadian Wildlife Service 1993). Antecedent efforts to examine the biological foundations of the Plan included a status assessment by the JVs and the CET (1996-97), the unpublished Technical Companion Document developed concurrently with the 1998 Update, the first NAWMP Continental Science

Forum (2002), and iterative planning and evaluation cycles in several of the habitat JVs. However, a comprehensive, continent-wide assessment of progress towards achieving the Plan's biological goals had never been accomplished and clearly was warranted as the Plan moved beyond its first 18 years.

The PC concluded that such an assessment needed to be an undertaking of the entire Plan Community and should be accomplished by the JVs and other partners working with the PC and the NSST. The endeavor would encompass the entire scope of Plan activities, including the institutional relationships among the JVs, the Flyway Councils, the NSST and the PC itself. The partners would also assess the status of adaptive processes necessary to ensure continuous improvement in Plan conservation programs.

This report summarizes the findings of that inquiry. Built upon written responses and formal interviews with each of the habitat and species JVs, written responses from each of the Flyway Councils and the Pintail Action Group (PAG), and meetings with the PC, the NSST, and the Joint Task Group (JTG) on Plan Goals and Harvest Management, this has been a wide-ranging assessment of progress and prospects for achieving the Plan's vision. We begin, however, by attempting to place this examination in the context of 20 years of change since the advent of the Plan.

D. WATERFOWL CONSERVATION 2006 vs. 1986

The challenges of attaining the NAWMP vision continue to evolve. Growing human populations, both in North America and around the world, are increasing demands for fresh water, food, fiber, energy and living space, all of which contribute to continuing loss and degradation of waterfowl habitat. For instance, skyrocketing energy prices are presently an important contributing factor to habitat change whether through oil and gas developments in the western boreal forest or expanding demands for biofuels on the prairies. Signals of changing climate and associated impacts on waterfowl habitats are growing and in places like the prairies, the boreal forest, and coastal wetlands such impacts may prove to be profound. Invasive diseases like West Nile virus and H_5N_1 avian influenza challenge waterfowl managers and affect public attitudes toward birds and wetlands.

Even waterfowl populations themselves are challenging us in new ways. Large numbers of mid-continent snow geese are contributing to the degradation of the Arctic ecosystems in which they breed. At lower latitudes, abundant Canada Geese are causing negative reactions to waterfowl in many urban areas. Conversely, declines of scaup and some sea ducks have worsened with few clearly discernible causes or solutions in sight.

On the positive side compared with 1986, the waterfowl conservation community is better-organized. Throughout the continent, habitat JVs are in place and achieving conservation gains. U.S. federal funding under the North American Wetlands Conservation Act (NAWCA) and complementary coastal wetland programs has greatly augmented resources for habitat conservation. New databases and spatial analysis tools are enabling creation of sophisticated biological planning and decision support models. Increased science capacity at the JV level,

particularly in the U.S., has positioned the JVs to strengthen their biological underpinnings. The adaptive processes advocated in the 1998 and 2004 Updates have begun to proliferate and offer a path to conservation success, even in the face of substantive ecological and socio-economic uncertainties. Increased technical sophistication and objectivity in waterfowl harvest management, coupled with growing recognition of the essential linkages between habitat conservation and harvest potential offer the promise of future management coherence and greater monitoring and assessment efficiencies. Nevertheless, we are still challenged to improve our knowledge of the relationships between habitat dynamics and waterfowl population responses at larger scales – knowledge needed to design and deliver even more effective waterfowl conservation programs and promote supportive public policies.

In the 1990s North America experienced an extraordinary population recovery of mid-continent ducks, and we learned a good deal about how that came about (e.g., Reynolds et al. 2001). We have "seen success" in some important geographic regions like the U.S. prairie potholes (Ringelman et al. 2005), vindicating some important assumptions about the relationship between habitat conditions and population growth. At the same time, the scale of the challenge before us is sobering. The recent duck population rebound occurred in conjunction with a very substantial increase in wetness across vast areas of the prairies, coupled with millions of acres of new grass brought about mainly by the Conservation Reserve Program (CRP) in the U.S. and elimination of agricultural transportation subsidies in Canada. These landscape changes dwarf what traditional direct wildlife programs have affected.

In many JVs, traditional wildlife habitat programs (e.g., land purchase, wetland management), while providing long-term security and engaging local landowners, cannot alone affect sufficient land area to achieve Plan goals. Increasingly, Plan partners are pursuing landscape change by encouraging incentive-based public policies (e.g., CRP, Wetland Reserve Program [WRP], Canada's Agricultural Policy Framework) or regulations (e.g., Swampbuster, wetland protection at provincial levels) or by working with landowners to enhance the quality of private lands for waterfowl (e.g., winter wheat extension, forestry best-management practices, grazing-system management). Building public support for conservation of the important ecological functions afforded by wetlands and associated uplands requires new and substantive investments in science and communications. All of these initiatives require special expertise and non-traditional funding support as well as novel performance measures, accomplishment tracking, and the same kind of objective evaluations of effectiveness that Plan partners have applied to traditional land-management programs. There is much left to learn and do.

When the Plan emerged it was the sole continental-scale conservation enterprise. In part because of the Plan's success, the North American Bird Conservation Initiative (NABCI) and its associated bird initiatives, along with other new broad fish and wildlife partnerships, have emerged to compete for staff and funding. Although most Plan partners believe that eventually we will accomplish more together than the Plan could have accomplished alone, the promise of greater funding and synergistic accomplishments has been achieved thus far in only a few places.

While circumstances have changed, waterfowl today face pressures that are as imposing as those faced in 1986 at the inception of the Plan. And, the most fundamental objective for Plan partners

remains the same; namely: we are challenged to conserve and enhance the productive capacity of North American waterfowl habitats.

E. PURPOSE OF THIS ASSESSMENT

In brief, the purposes of this assessment are:

1) To complete a first comprehensive assessment of progress in achieving the biological goals of the Plan, and communicate those accomplishments.

2) To identify desired biological outcomes and habitat needs to achieve those outcomes.

3) To strengthen the scientific underpinnings for the Plan and the JVs; specifically, to assess the status of adaptive processes needed to ensure continuous improvement in Plan programs.

4) To re-evaluate the resources needed to attain the full vision of the Plan

5) To improve effectiveness of institutional structures and relationships, especially communication between the JVs and the PC.

The results of this assessment should assist the Plan Community in a number of ways, including: setting the stage for the next Plan Update by clarifying the top priority needs for action; identifying additional support needed by the JVs and national partners for implementing conservation solutions; and importantly, allowing the PC to share with the Plan's financial stakeholders (e.g., North American Wetlands Conservation Councils, CWS, USFWS, USGS, Flyway Councils, federal appropriators, and other sponsoring agencies and organizations) a set of compelling recommendations for future conservation actions in support of Plan objectives. Because the JVs deliver nearly all Plan programs, it is important that this assessment also stimulates critical thinking by the JVs about how they might enhance their effectiveness for waterfowl.

More specifically, at a joint meeting in May, 2004 the Plan Committee, NSST and JV Coordinators concluded that the NAWMP Continental Progress Assessment should have five desired outcomes:

1) A regional and continental accounting of progress toward achieving the population and habitat goals and objectives of the Plan.

2) Renewed regional and continental population objectives and estimates of the landscape conditions necessary to achieve those objectives.

3) Affirmation that adaptive processes of planning, implementation and evaluation are in place and advancing throughout the Plan Community as advocated in the l998 and 2004 Updates.

4) A new synthesis of Plan accomplishments and future conservation needs on a continental scale.

5) The relationships among the key institutional components of NAWMP (PC, NSST, JVs, NAWC Councils, and Flyway Councils) are renewed, strengthened and clarified in order to help achieve Plan goals.

II. METHODS

A. INTRODUCTION

To conduct this assessment, the PC and the NSST developed a standard framework consisting of key outcomes and associated specific questions. These questions were to be addressed with a variety of measures, data sources, and dialogue, mainly with the JVs, but also Flyway Councils and other Plan partners. The logic flow builds from the assessment purpose to outcomes, to questions, to measures and associated data. The responsibility for conducting the assessment was assigned to an ad-hoc *International Assessment Steering Committee* (ASC) consisting of individuals with appropriate scientific expertise and institutional knowledge of Plan activities. Joint Ventures, the NSST (including representatives from each Flyway), U.S. Fish and Wildlife Service Migratory Bird Coordinators and Canadian Wildlife Service Migratory Bird Director were asked to nominate individuals to serve on the ASC. Thirteen individuals were selected and we agreed to serve on the ASC which includes 5 members from Canada, 5 from the U.S. and 3 from Mexico (Appendix A). A retired U.S. Fish and Wildlife Service employee with JV Coordinator experience was contracted to work under our direction with the primary duty of coordinating efforts to gather information needed for the assessment and compiling, analyzing, and reporting results.

B. THE REVIEW PROCESS

We formulated a questionnaire that addressed information needs for each of the 5 desired outcomes. The original questionnaire for habitat JVs was modified for the species JVs, Pintail Action Group (PAG), and the Flyway Councils (all acronyms used in this report are summarized in Appendix B). In addition, supporting information was requested consisting of JV management plans, scientific guidance, and decision making procedures. We interviewed all 20 JVs in Canada and the US plus Mexico. The Pacific Coast Joint Venture was done in two interviews; one for Canadian portion of this JV and one for the US portion. The Western Boreal Forest (WBF) program was not part of our assessment work, although accomplishments for the WBF are included in Table 1 and Appendix C to give a more complete picture of overall NAWMP and NAWCA accomplishments in North America. Each of 22 interviews was done by a team of 2-5 members of our committee. It took 7 months to complete interviews with all JVs. JV participants provided written answers to the questions and supporting information to each ASC team prior to the interviews. The meetings involved presentations from the JV participants and questions of clarification from us. The modified questionnaire sent to each Flyway Council included questions specific to flyway management, but due to timing constraints, interviews

were not conducted and only written responses were requested. Input from the PAG did not involve interviews.

Following each JV interview, the ASC interview team wrote a summary report capturing their general impressions, concerns, and recommendations which were shared with our full committee. Upon conclusion of all JV interviews, we met in Denver in February, 2006. Information from each JV summary plus additional comments from our committee members were recorded and discussed for accuracy, redundancy and relevancy.

III. RESULTS

A. PROGRESS IN ACHIEVING THE BIOLOGICAL GOALS OF THE PLAN

1. Introduction

The goal of the Plan is to restore waterfowl populations to 1970's levels. To achieve this, JVs were established in areas that traditionally support large numbers of breeding, migrating, or wintering waterfowl. Although JVs are responsible for habitat programs at the regional level, their collective efforts are intended to produce population responses at the continental scale. Our intent was to evaluate JV accomplishments relative to the Plan's goal of restoring populations to 1970's levels. More specifically we address the first desired outcome of the assessment: "A regional and continental accounting of progress in achieving the population and habitat objectives of the Plan."

Joint Ventures have largely relied on acres as a measure of accomplishment. Since 1986, over 13 million acres of waterfowl habitat in North America have received some form of protection, which is often permanent. Plan partners have also restored or enhanced over eleven million acres of wetland and upland habitat in the U.S. and Canada (Table 1).

Although some of these restored and enhanced acres are also included in estimates of protected habitat, many are additive to protection efforts. These include restoration and enhancement of previously secured public lands, or private lands where landowners maintain fee-title or do not opt for permanent conservation easements. Taken as a whole, these acre accomplishments testify to the tremendous effort and investment made by Plan Community members over the past two decades.

Although the goal is to return waterfowl populations to 1970's levels, JV's have largely avoided population estimates as a measure of accomplishment. This is understandable because waterfowl populations often fluctuate in response to environmental factors that are beyond JV control. Some JV's have attempted to link acre accomplishments to changes in key vital rates that limit population growth (e.g. nest success or non-breeding survival). Others like the PPJV have used annual surveys of breeding waterfowl to evaluate if existing landscapes can meet Plan population

goals. Still, our evaluation of progress at the regional and continental scales largely rests on interpreting JV acre accomplishments.

To evaluate progress using acre accomplishments, it is important to distinguish between "effects" versus "success" of Plan efforts (Appendix D). "Success" would be indicated by landscapes capable of supporting waterfowl populations at 1970's levels (key environmental factors like precipitation being similar among time periods). Even if we have not reached that goal, Plan efforts may have considerable "effect" by making progress in moving us in the direction of these landscapes. At the JV scale, such progress represents a net change in the amount and types of habitat needed to support waterfowl populations at NAWMP goals. Acre accomplishments can be used to index this progress provided that JV's have developed biological models that describe landscapes needed to meet waterfowl needs in terms of habitat type and amount. Progress at the continental scale obviously requires that individual JV's be successful in moving towards landscapes that can support 1970's population. However, progress is especially critical in those landscapes or JV's where life history events currently limit the size of continental duck populations. Without progress in these areas the Plan stands little or no chance of success at restoring waterfowl populations to NAWMP goals.

Table 1. A summary of acres of habitat impacted work by Joint Ventures and the Western Boreal Forest Program, 1986-2006. These data were provided directly by the Joint Ventures and were not verified by the NAWMP Assessment Steering Committee.

U.S. Joint Ventures	Protected[1]	Restored[2]	Enhanced[3]	Stewardship
Prairie Pothole	3,917,816	440,610	233,595	N/A
Atlantic Coast	3,219,919	353,065	433,972	N/A
Gulf Coast	123,103	137,129	220,395	N/A
Lower Mississippi Valley	625,186	741,861	455,098	N/A
Upper Mississippi Valley/Great Lakes	238,680	239,017	185,771	N/A
Playa Lakes	36,586	106,342	13,435	N/A
Central Valley	91,125	70,126	309,156	N/A
San Francisco Bay	43,000	5,023	4,982	
Pacific Coast (US Only)	284,905	33,230	43,028	N/A
Rainwater Basin	8,716			N/A
Intermountain West	90,476	189,007	45,003	N/A
Northern Great Plains	15,980		168,524	N/A
Central Hardwoods				N/A
Sonoran				N/A
US Subtotal	8,695,492	2,315,410	2,112,959	N/A

Canadian Joint Ventures	Securement[1]	Enhancement[4]	Management[5]	Stewardship[6]
Canadian Intermountain	295,413	41,250	60,589	0
Eastern Habitat	873,230	507,870	522,363	17,443,295
Pacific Coast (Canada Only)	107,206	88,446	84,773	0
Prairie Habitat	3,022,222	1,844,129	5,509,156	811,269
Western Boreal Forest[7]	24,849	107	107	7,595,032
Canadian Subtotal	4,322,920	2,481,802	4,376,988	25,849,596

[1] These acreages include acquisition by public or private agencies and include any protection from 10 year conservation easements to perpetual by private and federal programs.

[2] Acreage of wetlands and uplands that were restored for production, migration or wintering waterfowl. Some of these acres are included in the protected and securement categories.

[3] Enhanced acres include treatments to landscapes, both public and private, that were considered beneficial to waterfowl or other bird species during some period in their life cycle.

[4] Includes accomplishments associated with actions carried out on secured wetland and/or upland habitats to increase their carrying capacity for waterfowl populations and other wildlife. Enhancement also includes habitat restoration activities.

[5] Accomplishments associated with activities conducted on secured wetland and/or upland habitats to manage and maintain their carrying capacity for migratory birds and other wildlife.

[6] Accomplishments associated with conservation activities that either promote or directly result in the sustainable use of land for the purpose of conserving wildlife and their habitats they depend on. Because of the absence of legal or binding land agreement of at least 10 -year duration, accomplishment acres are not tracked as "Securement" acres.

[7] The Western Boreal Forest (WBF) program is currently not a JV approved by the PC. Work done in the WBF is conducted by Plan Partners currently working in conjunction with the Prairie Habitat JV.

Understanding continental level effects of NAWMP appear to be extraordinarily difficult given that we would have to be able to roll-up all the regional effects and understand the complex interactions of the various components of survival and fecundity that integrate to total population size. Instead, a regional examination of waterfowl production or survival may be a more realistic approach to gauge the effects of NAWMP.

We recognize that demonstrating positive effects of Plan habitat for duck populations is certainly not the sole criteria against which the Plan should be judged. We believe that the "positive influences" of the Plan habitat protection must be one of the criteria for evaluation even if there are no demonstrated effects on populations. For example, net gains in waterfowl habitat outside of major breeding areas represent a large benefit for waterfowl because they reduce the long-term probability that waterfowl numbers will be reduced by events during migration and winter. However, we emphasize that such habitat benefits are not a substitute for a solution to the inadequacy of habitat for reproduction on the prairies.

Although the purpose of our assessment was to evaluate conservation efforts that are directly attributed to the Plan, conservation programs and policy changes that are largely external to the NAWMP have had significant impacts on waterfowl landscapes since 1986. We included these programs and policy changes when discussing JV accomplishments because many Plan partners have worked hard to influence these external programs and policies to the benefit of waterfowl, and because they add further context when evaluating acre accomplishments that are directly attributable to the Plan. The remainder of this section examines progress towards achieving the objectives of the NAWMP. For discussion purposes we have divided our assessment of the Plan's progress into winter and migration habitats and mid-continent breeding habitats. The contributions of species JVs to meeting the goals of the Plan are also discussed. Finally, we offer some conclusions about our overall progress in restoring landscapes that can support waterfowl populations of the 1970's.

2. Progress in Winter and Migration Habitats

Outside of harvest, survival of migrating and wintering waterfowl is thought to depend on food availability. Biological planning for non-breeding waterfowl has typically focused on providing adequate foraging habitat, and changes in the amount of foraging habitat provides a measure of progress in meeting waterfowl needs outside of the breeding grounds. Acre accomplishments and net changes in habitat types important to non-breeding waterfowl suggest that Plan partners have provided substantial gains in foraging habitat, especially in JVs that winter a significant fraction of North American waterfowl. Both the LMVJV and CVJV have documented large net increases in foraging habitat over the past two decades, with habitat now sufficient to meet Plan population goals in all but the driest winters. Changes in foraging habitat in other JVs also have been substantial. For example, the GCJV has reported gains in many habitats that are critical to Gulf Coast waterfowl, though there is recognition that conventional Plan programs are incapable of addressing the scale of wetland loss now occurring in coastal Louisiana as a result of subsidence.

The progress achieved by Plan programs in meeting the needs of non-breeding waterfowl is related to a mix of biological and socio-economic factors. High densities of non-breeding waterfowl can be supported on relatively small areas, increasing the likelihood that habitat programs delivered on a modest scale can still provide population benefits. In addition, many non-breeding areas in the U.S. are characterized by a diversity of funding sources, agencies, and NGO's that provide multiple partnership opportunities for delivering Plan programs. Finally, agricultural producers in key non-breeding areas have widely embraced farming practices developed by Plan partners that benefit migrating and wintering waterfowl.

3. Progress in Breeding Areas

The 1990s provided strong evidence that the U.S. prairies were still capable of meeting and even exceeding Plan population objectives. The combination of exceptional water years, substantial amounts of grazing land in the Missouri Coteau, and CRP in the Coteau and drift prairie led to outstanding duck production in the mid to late 1990s. CRP produced substantial gains in upland cover, while easement programs aimed at permanently protecting native prairie have contributed to long-term protection efforts on the U.S. prairies. Together, these conservation efforts resulted in significant increases in nest success across a large landscape. The Swampbuster provisions of the Farm Bill, wetland easement programs, and until recently the U. S. Clean Water Act, have helped to maintain a wetland base capable of attracting high densities of breeding waterfowl. USDA policy that benefits waterfowl, coupled with easement programs that are funded with NAWCA, NGO, and Migratory Bird Conservation Fund (MBCF) dollars have paid large dividends for North American waterfowl.

Despite our accomplishments in the U.S prairies there are serious challenges ahead. Over 5 million acres of CRP in the U.S. prairies are due to expire between 2007 and 2010, with nearly 2.8 million acres expiring in 2007 alone. Reenrollment options of 10-15 years or extension options of 2-5 years have been offered on CRP contracts that are due to expire in 2007 and some reenrolled CRP acres are expected to qualify for increased rates. Even partial loss of CRP will likely reduce gains in upland habitat that have occurred over the past two decades because at the same time that CRP has converted cropland to cover, nearly 3 million acres of native grassland have been newly converted to cropland since 1985, largely in the productive Missouri Coteau. Some areas of the Coteau have experienced 2% annual loss rates of native grassland. Gains in upland habitat from CRP have essentially masked the ongoing conversion of grassland, and outright loss of CRP would reduce nesting cover in the U.S. PPR to levels not yet seen. In short, NAWMP related programs in the absence of CRP are not sufficient to maintain pre-1986 conditions, let alone realize net gains in upland cover. Finally, the recent Supreme Court decisions involving Clean Water Act cases may reduce protection for small wetlands and leave Swampbuster as the primary defense against drainage of prairie potholes. Swampbuster has been repeatedly challenged and policy efforts to maintain this provision of the Farm Bill will be critical to the Plan Community.

While the PHJV has evidence that the productive capacity of the Canadian prairies has improved slightly since 1986, the reproductive capacity of the Canadian prairies remains an estimated 7% lower than in 1971. While Agricultural census data indicate that land use has intensified (e.g.,

summer fallow replaced by annual cropping), tilled land has actually decreased by approximately 6 million acres since 1986, and by 2 million acres since 1971. Most of this change involved conversion of cropland to hay land and pasture, and resulted at least partly from changes in Canadian agricultural policy that eliminated federal grain transport subsidies. While this is a positive development for breeding waterfowl, wetland loss has continued since the 1970s and is believed to be largely responsible for the decline in reproductive capacity of the Canadian PPR that has occurred since 1971. Estimates of wetland loss by province and ecoregion range between 2.4 and 7.6% for the period 1971-2001, with a corresponding decline in duck carrying capacity of 4 to 11%. At more local scales wetland loss has approached 90% with a similar loss in reproductive capacity.

NAWMP programs have permanently secured and restored 200,000 acres of habitat that had been annually cropped (Devries et al. 2004). While this is a substantial accomplishment, these acres represent a tiny fraction of the Canadian PPR. The level of wetland restoration needed to achieve a stable duck population appears daunting. Even with elevated funding from key programs like NAWCA, it is unlikely that programs involving land purchases could provide the landscape needed to achieve breeding densities and reproductive success commensurate with NAWMP duck population goals. In addition to financial constraints, there are significant social impediments to using habitat purchases to meet waterfowl needs on the Canadian prairies. Landowners in some farm communities are resistant to having a large percentage of land transferred to public or NGO ownership for wildlife stewardship. Landowner "pushback" to what is considered excessive wildlife landholdings can provide real problems in achieving landscape level objectives if fee-title purchases are the only methods considered. Some Rural Municipalities in Saskatchewan have used laws that were intended to limit foreign ownership to halt new land purchase by waterfowl NGOs. While this is a relatively recent development in habitat protection in Canada, similar farm community resistance has a much longer history in other regions of the PPR, notably North Dakota. In that case, the state government placed acreage caps on federal ownership and on perpetual easements that were the chief means of using "wildlife dollars" to protect upland nesting cover and wetlands.

The economic, social, and biological limitations of land purchases are widely recognized by the PHJV, as is the need for policy changes and programs that affect duck populations at the prairie scale. Recent policy changes that have made perpetual wetland easements possible in the Prairie Provinces have been a step in the right direction, but the amount of protected small wetlands remains low. Also encouraging are recent efforts at the provincial level, supported by Plan partners, to develop watershed based plans that recognize the importance of maintaining wetland habitats. Similar large-scale efforts include extension programs for fall-seeded wheat that would provide extensive tracts of nesting cover in spring (directly funded by Plan partners), and changes in Canada's Agricultural Policy Framework that would recognize the economic value of ecological goods and services (EGS) that are provided by landowners who maintain healthy rural landscapes, including wetlands. The EGS concept would provide landowners with economic incentives for restoring and maintaining waterfowl in the context of normal farming activities.

4. Species Joint Ventures

Species joint ventures (Arctic Goose Joint Venture, Black Duck Joint Venture and Sea Duck Joint Venture) have made great progress toward the accomplishment of their initial goals. Unlike habitat joint ventures, whose focus is habitat conservation, the purpose of species joint ventures is to increase knowledge about the population biology of populations of geese, sea ducks and black ducks to improve their management. This improved knowledge relative to the pre-Plan era can be incorporated into adaptive management of populations of the targeted species to achieve desired population levels. In some cases, conservation measures are related to habitat management (e.g., protection of key wintering areas, migration refuge management, or mitigating broad scale influences on breeding habitat), but in many cases they are related to management of harvest at sustainable levels and identifying areas for international cooperation.

The AGJV created an information-needs matrix identifying several focal areas and population specific priorities for improving knowledge. This guided research and monitoring program throughout the Plan period and through three updates of the AGJV strategic plan, each incorporating new knowledge and revisions of priorities to reflect evolving management concerns. The JV partners fostered a shift in population monitoring from wintering areas to breeding areas where feasible and cost-effective (e.g., most Canada goose populations) to reduce confusion among admixed populations, while establishing effective surveys of other species where needed (e.g., mid continent white fronted geese). Widespread use of modern delineation techniques has improved knowledge of population or subspecies structure within closely related groups (e.g., brant, Canada geese). The AGJV has been instrumental in the identification and management of the issue of light goose overpopulation and its negative habitat impacts.

The BDJV has undertaken research and monitoring of population biology and habitat relationships of black ducks throughout the species range. Before the plan, breeding ground estimates of black ducks were unavailable and trends necessarily were based on winter indices. The partners have invested heavily in a comprehensive duck population monitoring program on the breeding grounds of eastern North America. This has permitted analysis of regional trends where habitat relationships and mortality factors may differ. The JV partners also conduct a coordinated banding program, and analysis of the data from it has led to greatly improved knowledge of survival patterns, mortality factors, and distribution. This information is central to the development of a new harvest management strategy.

The SDJV is the youngest of the three species JVs (established in 1999). It used the models of the other species JVs to create an innovative and dynamic JV strategic plan, recognizing the major gaps in information about sea ducks, perhaps the most neglected group of waterfowl in the continent. It has made use of innovative and leading edge technologies (e.g., implanted satellite transmitters, newly developed capture and marking techniques, GPS and GIS analysis) to learn about the annual cycles and in particular, seasonal distribution and concentration areas, and movements among them. This has revealed the critical importance of molting areas in the mating systems and structure of populations (e.g., scoters) and certain wintering areas (e.g., the movement of common eiders to Greenland where harvest is high). These findings have also led to differentiation of previously unrecognized subpopulations (e.g. eastern harlequin duck). Arguably, advancements in knowledge of sea ducks has been and will be more rapid than any other equivalent waterfowl group because of the creation and activities of this JV.

5. Conclusions

The JV concept has been overwhelmingly successful in developing the kinds of private and public partnerships envisioned in the 1986 Plan. Yet, acreage accomplishments reported by Plan Partners suggests that progress in meeting the original goals of the Plan has been mixed. JVs that support a large fraction of the continent's migrating and wintering waterfowl have demonstrated net gains in habitat types thought to limit waterfowl populations outside of the breeding grounds (e.g. foraging habitat). In some areas, acre accomplishments have created landscapes capable of meeting Plan population goals in all but the driest winters. In a similar fashion, species JVs have systematically addressed many of the key information needs identified by waterfowl managers over the past two decades and have allowed us to refine our understanding of what limits key species of ducks and geese. Despite these successes, acre accomplishments do not indicate adequate progress in all areas important to waterfowl. This is especially true of the Canadian prairies. Although Plan partners in the Canadian PPR have affected substantial acres of habitat, the region's reproductive capacity has continued to decline and much remains to be done before the Canadian prairies can again support populations characteristic of the 1970's. While the U.S. PPR has fared better than its Canadian counterpart, the loss of CRP would likely reveal a prairie landscape incapable of meeting NAWMP goals.

In general, our assessment of acre accomplishments at the Joint Venture scale suggests that progress in meeting the original goals of the Plan has been greater in non-breeding areas than in the Canadian and U.S. PPR. While geographic variation in progress is to be expected for both biological and socio-economic reasons, these differences must also be considered in light of what limits continental duck populations. Most managers agree that continental duck population growth is largely limited by events on the Canadian and U.S. prairies, at least for key species of dabbling ducks. The lack of progress in mid-continent breeding areas, especially in the Canadian prairies, will ultimately prevent waterfowl populations from returning to 1970's levels regardless of our accomplishments in other areas of the continent. This is not to diminish the importance of conservation efforts outside of the prairies. Acreage accomplishments in many of the non-breeding JVs have greatly diminished the probability that continental waterfowl populations will be limited by events outside of the breeding season, at least in the near future. That said, returning waterfowl populations to 1970's levels will require substantially more progress on the Canadian prairies than has occurred since 1986. We believe that more effort must go towards affecting reproductive rates of ducks through increased emphasis on breeding JVs, especially the PPJV and PHJV.

B. ADAPTIVE PROCESSES (MONITORING AND EVALUATION)

As early as 1992, the PC recommended that JVs establish committees to track, monitor, and demonstrate and evaluate JV accomplishments. The purpose was to ensure that dollars being spent on Plan projects resulted in the intended benefits to waterfowl. JVs were advised that they would be responsible for funding evaluation work; USFWS 1234 funds were suggested as a

possible source for some evaluation funding in the CET Evaluation Strategy for the U.S. (Sharp et al. 1992). Use of rigorous evaluation programs has been mixed (details below) but JVs that routinely evaluate planning assumptions and programs have improved their performance. For instance, several JVs have demonstrated convincingly that some habitat manipulations considered highly beneficial to ducks did not actually provide the anticipated benefits, and adjusted their programs accordingly. Many evaluation studies provided information that was useful for JV Management Boards to fine-tune habitat delivery but in other cases it appeared that the research did not address critical management information needs for the JV.

JV evaluation had evolved to very sophisticated levels in some JVs, particularly with efforts demonstrated by the PHJV. Here, JV partners have put forth a great deal of thought, effort, and funding toward tracking, monitoring, and evaluating their habitat delivery, including evaluation studies that seek to determine the impact of Plan habitat activities on waterfowl vital rates. We view this type of effort as crucial toward efficiently accomplishing Plan population goals by making sure habitat dollars are well spent. In particular, good evaluation of habitat programs is crucial in breeding area JVs where impacts on waterfowl reproductive vital rates are critical towards insuring Plan population objectives are met.

1. Tracking, Monitoring and Evaluation

The most basic accomplishment information collected by JVs is the acres of habitat affected, results which are needed by Plan partners, funding agencies, and the U.S. Congress to monitor progress towards accomplishing Plan habitat goals. JVs were given the responsibility of tracking habitat accomplishments. This information was then rolled up into national and international accomplishments.

The formation of diverse partnerships to achieve shared habitat goals has been one of the tremendous strengths of the Plan, but this has also complicated the process of habitat accounting. Some JVs indicated that different partners use different tracking tools, different definitions for alternate forms of habitat protection, and may independently count the same acres when multiple groups are collaborating on one NAWMP project. These problems at the JV scale are compounded when JV accomplishments are rolled up at the continental level. The lack of consistent information on JV habitat accomplishments exacerbates the difficulty in evaluating biological success of the Plan all the more difficult. The Plan has had a tremendous impact on habitat conservation in North America (Table 1), but the precise number of acres affected is poorly known.

2. Joint Venture Prioritization

The 1986 Plan identified priority regions where waterfowl conservation work would be concentrated. The founders of the Plan recognized that certain parts of the continent were disproportionately more valuable to waterfowl than others and that these regions should receive priority attention for funding and habitat conservation efforts.

When the Plan was penned the waterfowl community had evidence that breeding habitats were restricting populations in most years and that the Plan should focus on the prairie pothole region and some other key production areas. That conviction has received even more support in recent years with more detailed population analyses of mid-continent mallards and several other ducks that primarily nest in the prairies. To be successful at noticeably increasing duck populations, especially key species in the harvest, Plan partners must ensure that a majority of habitat efforts are directed to the breeding areas that limit most populations. That will require a greater percentage of transferable funds (i.e., NAWCA and MBCF funds) designed to benefit waterfowl populations and habitats be targeted to breeding ground JVs for priority habitat efforts. NAWCA expenditures by JV are summarized in Appendix C.

3. Continued Habitat Loss

Wetland and upland habitats continue to be lost at an alarming rate. The North American human population continues to grow and negatively impact habitats important for many species of wildlife. Despite the positive influences of Plan activities on waterfowl habitats, National Wetland Inventory (NWI) data in the US shows that some wetland types most important to waterfowl are still declining (Dahl, T. E. 2000). Unfortunately, we learned that few JVs have documented the rate at which waterfowl habitats are being lost in their regions. To insure success of the Plan, we believe that JVs must develop procedures to track habitat losses so that they understand the amount of habitat restoration and enhancement projects that are necessary to offset these losses. Moreover, understanding the rates and causes of losses may help guide policy efforts to slow those losses. It is surely far more cost efficient and biologically effective to forestall habitat losses than to restore already lost habitats.

C. JV CHARACTERIZATION

Team members summarized information about the performance of each JV using questionnaires and additional materials provided by JV staff. These summaries considered:

(1) Basic information for each JV, such as its primary habitat focus (breeding, migration or winter, or some combination), history and current status of the JV, staffing, and structure of the technical committee.

(2) The state of its biological planning, including efforts to identify key limiting factors, develop planning tools, assess the effects of habitat accomplishments on waterfowl populations and engage in policy initiatives in addition to direct habitat programs.

(3) The state of its evaluation efforts to test key planning assumptions, respond to information obtained through JV actions in updating and re-planning, and prioritize monitoring and evaluation needs.

(4) The level of accomplishment tracking with respect to habitat gains and losses, changes in desired waterfowl population response, or prioritization and allocation of resources to critical habitat needs.

Each summary was then condensed, yielding general trends concerning overall performance of JVs in meeting biological and planning expectations, or achieving features of well-functioning JVs (Tables 2, 3 and 4 and see Appendix F). The intent of these analyses is not to focus attention on any specific JV. Rather, the goal is to provide an integrated summary of how and where the Plan, in its entirety, has progressed and succeeded, and where more work needs to be undertaken.

1. Habitat JVs and México

There was remarkable variation among JVs in performance metrics, with older, established JVs typically having better-developed planning and evaluation processes (Table 2, 3). These older JVs are cornerstones to future NAWMP success in achieving waterfowl population goals. The strengthening of US-based JVs by hiring science coordinators is a positive step, and should help to alleviate some deficiencies. For instance, in many JVs, greater effort is needed to improve technical capacity to guide program delivery, link habitat or policy actions to population responses at appropriate spatial scales, and thus accelerate the biological planning process. By engaging the research community, developing evaluation programs to more quickly inform management decisions, and implementing better methods of assessing net landscape changes, most JVs could substantially enhance their performance. Likewise, better communication is needed among JVs - particularly neighboring ones - and the remainder of NAWMP's science and management communities.

2. Species JVs

These JVs have strong technical committees that provide clear guidance on changing research priorities, and regularly engage a broad research community (Table 2, 4). New information has been used quickly to influence management decisions (e.g., goose harvest), or is being integrated into developing population models for lesser-known species (e.g., sea ducks). Better communication is needed among species JVs and relevant habitat JVs and Mexico. Additionally, testing assumptions implicit in population management models, for instance as exemplified by recent work on "light" geese, should become common-place.

Table 2. Summary of JV characterizations, showing main strengths and deficiencies in habitat and species JV performance metrics as judged by consensus among JV assessment teams consisting of 2-4 evaluators (see Table 3 for Habitat JV summaries and Table 4 for Species JV summaries). The Western Boreal Forest Program is not included in these summaries.

HABITAT JVS (N = 19 including Mexico; Pacific Coast JV split into USA and Canada)

Basic background

- Over half of the JVs (10) have updated their implementation plan at least once; some (newer) JVs have not.
- The number of JV staff ranges from 4 or more (7 JVs), while 5 JVs have only one.
- The majority (14) of JVs now have a science coordinator, but 8 were hired after 2002.
- Almost all (17) habitat JVs have a technical committee, although 2 did not.
- However, influence of technical committees on JV work was thought to be only moderate (7) or low (4). Influence of technical committees was considered large in only 7 JVs.

Biological basis & planning

- Progress on biological planning was limited for many JVs.
- A majority of JVs (10) has only limited knowledge of key vital rates and only 2 JVs appeared to have a high level of certainty of key vital rates.
- Similarly, a majority (12 JVs) had only a limited or a developing understanding of landscape habitat attributes that most influence key vital rates.
- Remarkably few habitat goals were based either fully (5 JVs) or partly (3) on stepped down continental goals; most (11) were not.
- The transition of population goals to habitat goals was also weak or developing in a majority of JVs (11) and was strong in only one-third (6 JVs).
- Most JVs have only a limited ability to determine the effect of habitat accomplishments on waterfowl reproduction or survival (13).
- Likewise, most JVs (11) cannot estimate the net change in habitat conditions, although some JVs were able to this well (4) or moderately well (4).
- Despite this limitation, most JVs have made moderate (10) to excellent (5) progress in developing biological models and planning tools while the remainder (4) were in the early stages of developing such tools.
- Many JVs place moderate (8) to much (2) emphasis on policy efforts and initiatives.

JV evaluation processes

- Given the challenges facing many JVs in their biological planning processes, many have a limited ability to evaluate JV success.
- Only a small number of JVs have tested key assumptions underlying their planning models (4 well, 1 moderately so).
- Most JVs (12) cannot track changes in waterfowl numbers or distribution in response to JV activities; a smaller number of JVs do this well (4) or moderately well (3).

- Most JVs are working hard to prioritize evaluation & monitoring needs (12), and many (8) have made changes to planning tools or are beginning to do so (4) in response to what has been learned.
- Most JVs have (7) or are developing (10) feedback and re-planning processes to refine JV actions.
- A majority of JVs has been successful at engaging the research community (11) to help in these pursuits; many of the remainder are working to do so.
- A potential concern for long-term planning is that few JVs have attempted to build climate change into their planning models (1 JV has done so, only 3 others are planning to do so).

JV accomplishments

- The ability of JVs to track accomplishments was varied.
- Most JVs were able to track habitat acres delivered (10 well, 3 moderately), although some had limited ability to do so (5).
- Only a single JV was able to determine whether habitat delivered had a detectable effect on populations or vital rates (and in that case, the answer was no); for most JVs (16) this remains unknown.
- Several JVs (5) either did not report or could not determine the percent of original habitat goals that had been accomplished. However, most JVs (14) could determine their acreage accomplishments; of these, about half had accomplished up to 50% of their goal (7), while most of the remainder had accomplished 50-100% of their goals. Two JVs have exceeded 100% of their targets.
- It is difficult to determine the percentage of NAWCA resources allocated to waterfowl focused efforts. Many JVs (8) seem to spend the majority of funds (>75%) on waterfowl, while others are spending at least 25-75% (the wide range simply reflects the difficulty in obtaining precise estimates or limited confidence in these estimates). Two JVs appear to have allocated less than 25% of NAWCA resources to projects targeted specifically to benefit waterfowl.
- Most JVs have made considerable progress in prioritizing habitat work, although a number (6) continue to pursue habitat objectives primarily on an opportunistic basis.
- There was considerable variation among JVs in how quickly they act on new information; several do so quickly (6), or moderately so (4), but many (6 JVs) were slow to act on new information or were just developing the means to do so.
- Relatively few JVs communicated well with other JVs (2 well, 6 moderately); most (11) had limited communication with other JVs.

SPECIES JVS (N = 3)

Basic background

- Two JVs have not yet updated strategic plans. SDJV is relatively new but BDJV developed its initial strategic plan over 14 years ago (1992).
- All species JVs have a single staff person; only one has a science coordinator.
- All JVs have a technical committee and the influence of this committee on JV work was judged to be strong.

Biological basis & planning

- Knowledge of key vital rates was mixed (well known for some geese and American black ducks, poorly known for most sea ducks). In all cases, there was considerable uncertainty about limiting factors.
- All JVs had only a limited understanding of the landscape attributes that most influenced key vital rates.
- Progress in developing biological models and planning tools was well developed for American black ducks and some goose populations, but limited for sea ducks.
- All JVs have attempted to integrate the full annual cycle in biological planning to at least a moderate degree.

JV evaluation processes

- There has been mixed success in testing key assumptions underlying planning models (best developed for light geese and some Canada goose populations; moderately for American black ducks and other geese, poorly for sea ducks).
- All JVs are effective at prioritizing evaluation & monitoring needs, making changes to their planning tools in response to what has been learned, and developing feedback and re-planning processes to refine JV actions.
- AGJV and BDJV have been successful in developing methods to track changes in waterfowl numbers or distribution in response to JV activities, while this remains a challenge to the SDJV.
- All JVs have been successful at engaging the research community.
- None of the species JVs has explicitly built climate change into their planning models.

JV accomplishments

- Success in achieving the original population goals has been mixed (1 successful, 1 not). Population goals have not yet been established for sea ducks.
- All JVs have made considerable progress in prioritizing research and monitoring work, and all three JVs act quickly on new information as it emerges.
- Communication with other JVs was moderate (2) to limited (1).

Table 3. Summary evaluations of the 19 **Habitat Joint Ventures** as judged by consensus among JV assessment teams. Color-coding simply indicates the number of JVs that shared a given rating (darker blue indicates a larger number). The Western Boreal Forest Program is not included in these summaries.

Background	**Summary of Background Information**			
Focal periods of the annual cycle?	Breeding **2**	Migration (Breeding) **5**	Migration (Winter) **7**	Winter **5**
Year the JV was founded.	1986-90 **8**	1991-95 **6**	1995-2000 **3**	2000-05 **2**
Date the 1st implementation plan completed.	1986-90 **8**	1991-95 **5**	1995-2000 **1**	2000-05 **5**
How often was implementation plan updated?	NA **2**	Never **7**	Once (or underway) **7**	Twice (or 2nd underway) **3**
Current number of JV staff.	Unknown **1**	One **5**	2-3 **6**	4 or more **7**
When did the JV get a science coordinator?	Unknown **2**	None **5**	After 2002 8	Before 2002 **4**
Does JV have a functional Technical Committee?	Unknown	No **2**	Developing	Yes **17**
Level the Technical Committee influences JV work?	Unknown **1**	Limited **4**	Moderate **7**	Great **7**

Biological basis & planning for habitat delivery	**Level of Progress in Planning & Implementation**			
Knowledge about key vital rates in the JVs region?		Limited **10**	Moderate **7**	Great **2**
How thoroughly understood are landscape habitat attributes that affect vital rates?		Limited **12**	Moderate **5**	Well **2**
How well has the JV developed biological models and planning tools for habitat delivery?		Limited **4**	Moderate **10**	Well **5**
Were JV habitat goals derived based on a step-down of continental population objectives?		No **11**	Partly **3**	Yes **5**
How sound is the transition of population goals to habitat goals?		Limited **11**	Moderate **2**	Strong **6**
How well can the JV estimate effects of habitat accomplishments on survival or reproductive rates?	NA **1**	Limited **13**	Moderate **4**	Well **1**
How well can the JV estimate net change in habitat conditions (wetlands & uplands)?		Limited **11**	Moderate **4**	Well **4**
What effort is placed on policy or other non-direct habitat programs to achieve desired landscapes?		Limited 9	Moderate **8**	Great **2**

JV Evaluation processes

How well has the JV tested key assumptions or parameters of their planning models?	Unknown **1**	Limited **13**	Moderate **1**	Well **4**
How well does the JV prioritize evaluation and monitoring needs?		Limited **7**	Moderate **7**	Well **5**
Have changes been made to the planning tools in response to what has been learned?	Unknown **2**	No **5**	Some or Developing **4**	Yes 8
Are there clear feedback and re-planning processes for refining JV actions?		No **2**	Developing **10**	Yes **7**
How well does JV track waterfowl abundance or distribution in response to JV activities?		Limited **12**	Moderate **3**	Well **4**
How well does JV engage the research community?	NA **1**	Limited **7**	Moderate **6**	Well **5**
Has the JV attempted to build climate change into their conservation planning?		No **15**	Developing **3**	Yes **1**

JV Accomplishments

JVs tracking of acres of habitat delivered.	NA **1**	Limited **5**	Moderate **3**	Well **10**
Percent of original habitat goals achieved by JV.	Unknown, or not reported **5**	<50% **7**	50-100% **5**	>100% **2**
Has the habitat increased populations (or vital rates) to the extent expected? (Unknown = cannot estimate)	Unknown **16**	No **1**	NA **2**	Yes **0**
What fraction of NAWCA resources does JV allocate to waterfowl vs. other animals or habitats?	Unknown or not reported **4**	<25% **2**	25-75% **5**	>75% **8**
How well does JV prioritize habitat work vs. acting opportunistically?		Opportunistic **6**	Mixed **7**	Well prioritized **6**
Does JV act on new information?	Unknown or NA **3**	Slow or developing **6**	Moderate **4**	Quickly **6**
How well does JV communicate with other JVs?		Limited **11**	Moderate **6**	Well **2**

	Number of JVs
	≥10 (> 50% of JVs)
	8–9 (40-50%)
	6–7 (30-40%)

Table 4. Summary evaluations of the 3 **Species Joint Ventures** as judged by consensus among JV assessment teams. Color-coding simply indicates the number of JVs that shared a given rating (darker blue indicates a larger number).

Basic Information	**Summary of Background Information**			
What are the focal periods of the annual cycle?	Breeding 0	Migration 0	Winter 0	All 3
When was the JV founded?	1986-90 2	1991-95	1995-2000 1	2000-05
When was the initial strategic plan completed?	1986-90 1	1991-95 1	1995-2000	2000-05 1
How often has the strategic plan been updated?		Never 2	Once (or underway)	Twice (or 2 underway) 1
What is the size of the current JV staff?		One 3	2-3	4 or more
When did the JV get a science coordinator?		None 2	After 2002 1	Before 2002
Does the JV have a functional Technical Committee?		No	Developing	Yes 3
How strongly does Technical Committee influence the work of the JV?		Little	Moderate	Strong 3

JV Biological basis and planning for research and monitoring	**Level of Progress in JV Planning & Implementation**			
How well known are the limiting factors or key vital rates?		Limited 1	Moderate 1	Well 1
How thoroughly understood are relationships between landscape attributes and vital rates for populations?		Limited 3	Moderate	Well
How well has the JV developed biological models and planning tools to facilitate management?		Limited or developing 1	Moderate 1.5	Well 0.5
How much emphasis has been given to integrating the full annual cycle in biological planning for the species?		Limited	Moderate 2	Well 1

1054

JV Evaluation processes

How well has the JV tested key assumptions or parameters of their planning models?		Limited or developing 1	Moderate 1.5	Well 0.5
How well does the JV adequately prioritize evaluation and monitoring needs?		Limited	Moderate 1	Well 2
Have changes been made to the planning in response to what has been learned?	NA 1	No	Some or Developing	Yes 2
Are there clear feedback and re-planning processes for refining JV actions?		No	Developing	Yes 3
How well does/can the JV track waterfowl population trends (changes in abundance or distribution) in response to JV activities?		Limited 1	Moderate 1	Well 1
How well does the JV engage the research community?		Limited	Moderate 1	Well 2
Has the JV attempted to build climate change into their conservation planning?		No 3	Developing	Yes

JV Accomplishments

Has the original population goal been achieved for the species?	NA 1	No 1	Developing	Yes 1
How well does JV prioritize its research and monitoring work vs. acting opportunistically?		Limited	Moderate 1	Well 2
How quickly does the JV act on new information as it emerges?		Slow	Moderate	Quickly 3
How well does the JV communicate with other appropriate JVs?		Limited 1	Moderate 2	Well

	Number of JVs
	3
	1.5–2

1055

D. TRENDS OF NORTH AMERICAN WATERFOWL POPULATIONS

Our efforts at assessing the Plan and addressing the 5 desired outcomes and purposes did not include a close look at the current status and trends of North American waterfowl populations. However, we would be remiss if we did not at least address this issue in a general way and provide the PC with some general observations for their consideration in the next Plan Update.

To do this we used information previously published in the 2004 Plan Update as the basis for our review and information on limiting factors and conservation efforts as added based on our collective knowledge of published studies and on-going work in the field (Appendix E). Trend data from the 2004 Plan Update was updated for 2004-2006 for 11 common species of ducks (Table 5)

Table 5. Summary of North American Waterfowl Population Trends, l970-2003[a]

Number of Species, Subspecies, or Populations

	Increasing	Decreasing	No Trend	Unknown
Ducks	20	14	13	2
Geese	12	1	15	6
Swans	5	0	1	0

[a] Table 5 includes updated 2004-2006 trends for mallard, northern pintail, gadwall, American wigeon, American green-winged teal, blue-winged teal, northern shoveler, redhead, canvasback, lesser scaup, and greater scaup.

Ducks represent the only major waterfowl group where populations are known to be declining and four are listed as threatened or endangered under the U. S. Endangered Species Act. Of the 49 species, subspecies, or populations of ducks noted above only 12 have quantified NAWMP population objectives. Of these, 5 exhibit an increasing trend, 3 decreasing, and 4 no trend. Notable species that have experienced long-term declines or remain well below Plan goals include northern pintail, lesser scaup, and American black duck. In species that are above goal or have been increasing since 1970, direct links to NAWMP programs cannot be made with certainty for reasons explained above.

Of 14 duck groups that have declined, half are eiders. As a group, half of all sea ducks are declining, including all three species of scoters. For a majority of sea ducks, limiting factors are largely unknown (although adult survival is expected to be important, as anticipated also for geese and swans [see below]) and options for conservation actions other than regulating harvest may be limited. Most sea ducks do not yet have quantified NAWMP objectives.

Of 34 goose groups covered in the Plan, only one is known to be declining. For the majority of geese, limiting factors are unknown and habitat conservation actions directed toward limiting factors is limited; however, for geese, regulatory actions play an important role in overall population management (Appendix E). Twenty percent of these goose groups have no current quantified NAWMP objectives.

As a group, swans are mostly increasing throughout their range. Limiting factors for swans are largely unknown and specific habitat conservation measures directed toward swans are limited.

All native populations of swans have quantified NAWMP objectives; the exception being the exotic mute swan.

E. MÉXICO

1. Context

México does not have a JV system, and employs a different approach to conservation planning and implementation. The country is ranked 4th in the world for overall wildlife species richness. The main causes of declines and threats to biodiversity are loss, fragmentation and degradation of natural habitats; these are linked with the growing human population and, consequently, the expansion of the agriculture and urbanization. México has 32 species of waterfowl, including five resident species and 27 shared with the U.S. and Canada, the latter species arriving mainly through the Pacific and Central Flyways. In an average year, México supports 7 to 17 % of migratory waterfowl in North America.

México joined the NAWMP in 1994, and México's Wildlife Office (Dirección General de Vida Silvestre-SEMARNAT) opened in 1996. The Wildlife Program's main objective is to achieve wildlife and habitat conservation through scientifically-sound, sustainable use while generating long-term, socio-economic benefits to local people. Private land may be registered as an UMA (Conservation Wildlife Management Unit), and their integration results in a wide regional SUMA, or System of UMAs. In México, many landowners share land holdings in a communal way, called "Ejidos", additional wetlands are under federal jurisdiction. The Wildlife Office along with the National Waterfowl Subcommittee is currently working through regional meetings to develop management plans and standardized monitoring techniques (terrestrial and aerial) for waterfowl populations and habitat. Waterfowl priorities are to stop and reverse habitat loss and degradation. The Wildlife Office has identified five waterfowl regions and 28 priority wetlands, 7 in the Gulf Coast, 14 in the Pacific Coast, and in the 7 Central Plains. Listed priority species include: redheads and white-fronted geese on the Gulf coast, brant on the Pacific coast, and resident waterfowl in the central plains.

2. Accomplishments

In México, wildlife and habitat conservation programs emphasize sustainable land management with socio-economic benefits and, notwithstanding the Natural Protected Areas system, permanent land acquisition has limited applicability. The 210 waterfowl UMAs combined contain 2,594,000 acres, where the main objectives are habitat conservation, restoration and sustainable use through hunting. Many other institutional activities have been directed to wetland conservation, such as the Ramsar initiative, and Natural Protected Areas. These efforts are conducted by the SEMARNAT-CONANP (Natural Protected Areas Commission), and many are key waterfowl areas. México has 58 Ramsar sites that cover 12,592,500 acres.

The Plan's investments since 1991 have stimulated México's wildlife program, not just in terms of direct funding, but also in terms of developing programs in applied science, learning, outreach, and habitat management measures. From 1991 to 2006, $25.7 million (US dollars) in NAWCA support has been used for 194 projects, which attracted matching contributions (cash and in-kind) of more than $38 million. More than half of these projects consisted of baseline studies, planning and training (development) and most remaining direct conservation projects focused on restoration and management actions, rather than acquisition.

The UMA/SUMA system provides an innovative approach to meet conservation needs for waterfowl in México. The approach encourages local community investment and commitment to conservation practices. A potential limitation of this system is the limitation of personnel (UMA technicians) needed to assist planning, analysis and management. Large-scale planning and evaluation will need to be directed by the Wildlife Office.

México currently does not have resident waterfowl population objectives. The Waterfowl Subcommittee is working to establish regional population objectives through the development of the National Waterfowl Project (Project for the Management, Conservation and Sustainable Use of México Waterfowl Species) and Type Management Plan with respective SUMAs. As with many JVs in Canada and the US, México has been unable to determine whether habitat accomplishments have influenced vital rates or population responses. Efforts are underway to identify limiting factors and facilitate adaptive management for each SUMA through the Type Management Plan.

3. Monitoring and Evaluation

Currently, waterfowl surveys in México are being designed and implemented with the collaboration of the U.S. Fish and Wildlife Service, which has completed a winter survey every three years. Furthermore, a bird banding program is being developed in conjunction with Canada and the U.S. The Mexican scientific support team must be fully involved in these processes, requiring a concerted capacity building effort at all levels. There is a significant need to increase overall NAWMP capacity in México and to initiate longer term and larger scale planning. This will require considerable strategic support from the entire Plan Community given limited staff and other constraints.

México also needs a habitat assessment protocol that is both inexpensive and technically simple to facilitate rapid deployment; it is recommended that U.S. and Canada share their habitat evaluation protocols and techniques with Mexican colleagues. Likewise, more thought and integration must be directed to increase monitoring and evaluation efforts in México; impacts of conservation investments are rarely evaluated in a rigorous manner.

By working closely with JVs located near México and sharing experiences and projects, SUMAs could adopt the role of JVs. Thus, input from the Sonoran, Gulf Coast, Sea Duck and Arctic

Goose JVs would be most helpful and welcomed by México. Stronger interactions, idea sharing, and co-training need to be developed between Mexico and the Plan Community.

IV. LOOKING AHEAD-WHERE DO WE NEED TO GO?

A. PLANNING

1. Continental and Regional Population Goals

The Plan Community faces huge challenges with competing demands for water, food, fiber, energy, and space for other human development. With these increasing demands and the on-going loss of natural habitats such as grasslands and wetlands, simply "holding the line" may be a challenging objective. Despite 20 years of Plan efforts, loss of wetlands and associated habitats in breeding, migration, and wintering areas continues.

In response to this and other challenges, some JVs have left the original Plan goals behind as a metric directly used in conservation planning. However, such an approach runs the risk of adopting a strategy whereby each JV establishes independent and poorly coordinated conservation goals, undermining the coherence provided by the original Plan. Several JVs commented that the "stretch" goal of 1970's population objectives – while a laudable long-term goal – may not be achievable in the current socio-economic context. Accordingly, there is a growing consensus that attainable short-term goals at continental and regional levels need to be developed, while ensuring that efforts to achieve the original goals of the Plan are maintained as a long-term vision.

The process of "stepping-down" continental population objectives to Flyways, regions or JVs remains a concern for some JVs and Flyway Councils. Some were unclear how this was accomplished; others questioned whether such an approach best targets conservation efforts where they are most needed. The 2004 Plan Update addressed some of these issues through the species prioritization analysis for waterfowl conservation regions (WCRs), the Plan's geographic units for prioritization at the regional scale. Further efforts to translate species priorities into geographically-based population and habitat objectives for each JV would be valuable. Clarification and refinement of the process for stepping-down objectives within WRCs or JVs should be guided by the PC and the NSST and involve the Flyways.

2. Integrating Habitat, Harvest and Stakeholders

Plan partners stressed the need for coherency at all levels, including the need to more fully engage both the harvest management and habitat management communities in developing a coordinated action plan for realizing Plan objectives. The 1986 Plan clearly recognized the

importance of integrating habitat and harvest management to maintain "adequate abundance and diversity of waterfowl populations for all users". However, in subsequent updates, harvest management concerns were devolved to the control of Flyway Councils and Federal and State agencies as Plan partners and JVs sharpened their focus on habitat programs. Increasingly elaborate programs and methods have been developed to manage harvest, map habitat, and model populations. Yet today, these components operate largely in isolation and with little forethought to their impacts on one another.

Potentially, harvest policy can influence whether population objectives of the Plan are met, irrespective of the Plan's habitat conservation efforts (Runge et al. 2006). For example, an overzealous harvest strategy for species with additive hunting mortality could make it difficult to achieve Plan population objectives no matter how much habitat conservation had been achieved. Conversely, curtailment of harvest to achieve Plan population goals would be viewed as a failure by members of the Plan Community. Plan partners recognize that harvest potential depends on the ability of the North American landscape to produce and sustain waterfowl. Without a well-defined linkage between harvest management and habitat conservation, optimal decisions regarding the waterfowl resource cannot be made. Further, coherence between habitat and harvest management objectives will remain incomplete without consideration of hunter satisfaction and other socio-economic considerations such as non-consumptive uses of waterfowl, crop depredation and waterfowl overabundance issues. A framework for unifying waterfowl management at the continental scale must ultimately incorporate all three elements: habitat, harvest, and socio-economic considerations (i.e., costs and benefits associated with specific population targets).

In 2005, the International Association of Fish and Wildlife Agencies, Adaptive Harvest Management Task Force and the PC commissioned a Joint Task Group on NAWMP Goals and Harvest Management (JTG) to develop options and recommendations for clarifying Plan population objectives and their use in harvest management. This process is currently on-going. We believe that the upcoming JTG report and its recommendations for further action will be a key component of future waterfowl management. Explicit linkages between harvest and habitat management will motivate a review and possible revision of Plan population objectives. Any change in Plan population objectives will necessarily require extensive dialogue between harvest and habitat managers. The JTG is the current focus of this technical dialogue, but going forward, waterfowl managers need to commit to both continuing technical connections and policy-level discussions around population objectives. Presently, there is no administrative body charged to advance such discussions – one will need to be created and empowered to reach consensus on future objectives.

3. Linking Habitat to Population Responses and Vital Rates

Continental population objectives are expressed as abundances; however, to achieve desired population goals, Plan activities ultimately must influence key vital rates. While most JVs recognize the value of linking Plan achievements to measures of population response, rather than simply tallying acres and dollars, there is considerable uncertainty as to how (or if) this can be done reliably at regional and continental scales. Questions were raised about which vital rates

(e.g., recruitment, survival) should be used for planning purposes and how targets for these vital rates should be established. Such an approach may be most tenable for breeding area JVs, where there is potential to evaluate the influence of habitat programs on vital rates such as nest success or breeding season survival. However, questions remain about how habitat programs on winter or migration areas influence survival or body condition and in turn, continental waterfowl populations. Clarification is needed from the NSST and the PC on how JVs should move forward to directly link habitat efforts to vital rates and population responses. If we cannot identify critical limiting factors in a given geographic region, alternatives will be needed so that JVs can direct their conservation efforts in an accepted, defensible manner.

To move forward, every JV should develop explicit, biologically-based planning model(s) that predict how on-the-ground habitat actions will affect vital rates or population responses. Such an approach would, minimally, oblige JVs to articulate key assumptions or uncertainties, develop appropriate evaluation plans and provide a basis for further refinement of planning models. These efforts could be supported through the development of a centralized capacity to provide modeling expertise. Considerable resources have been invested to develop adaptive harvest management at a national level. Similar efforts could provide a framework for continental adaptive habitat management and science support. This should be a centralized charge to the NSST or a new adaptive habitat management team, rather than the sole responsibility of each JV, many of whom lack the necessary resources.

4. Prioritization

Plan priorities must continue to be developed at a continental scale and the PC needs to be bold in establishing which regions have precedence for addressing critical conservation needs. Not all JVs can be expected to contribute equally to North American population objectives. Accordingly, the PC must prioritize among regions to provide the landscape conditions that will sustain populations (of all species) at goal levels. This will likely require a re-distribution of Plan resources to the areas that limit populations. Conservation dollars must be allocated in a manner that will maximize benefits to continental waterfowl populations. This message must be communicated effectively and forcefully to all Plan partners.

JV partners also expressed the need for a clear science-based vision of the 'end game' – how will we know we are done? Without clearly defined endpoints, there is a risk that JVs will continue to pursue a "business-as-usual" model, even in areas where original objectives have largely been met and limiting factors have been addressed. Identifying conservation endpoints will itself be an evolving process as continuing uncertainties and new challenges (below) confront NAWMP planners. Success will depend on the ability to identify and react to these changes, and to re-plan accordingly. Adaptive management processes - continuous use of biological models, evaluation and re-planning - could help JVs meet challenges and foster success.

After 20 years, a surprising diversity of approaches exists across JVs in the way conservation programs are planned and evaluated. Some JVs continue to pursue conservation actions in an opportunistic fashion based only on major (sometimes untested) assumptions, without explicit biological planning models or the means to evaluate the effectiveness of JV efforts. By contrast,

many JVs have or are developing excellent planning tools and routinely evaluate the impact of habitat or other programs (Tables 2, 3 and 4). The PC must provide strong guidance and incentives so that all JVs develop strategic, biologically based planning frameworks and identify clear endpoints that will indicate JV success.

5. Continuing Challenges

Environmental variation is a pervasive influence on waterfowl populations, and planning for "average" or even "good" (e.g., 1970s) conditions is a challenge – conceptually and operationally – for most JVs. Should JVs be targeting average conditions or planning for worse case scenarios? Some JVs, either implicitly or explicitly, appear to be planning for worse case scenarios, a strategy that would be effective only where infrequent events have a disproportionate influence on long-term viability of continental populations. Conversely, other JVs commented that setting Plan objectives based on average environmental conditions is fundamentally inconsistent with the way most duck populations respond to dynamic environments (e.g., prairies, Arctic). Plan goals should be expressed more explicitly in terms of ranges of population objectives representing poor and good conditions.

As recognized in the 2004 Update, several groups of waterfowl (scaup, sea ducks [especially scoters], and northern pintail) require increased attention because of declining or low populations. Currently, there are no Plan continental population goals for sea ducks, or some of the less common species (e.g., mottled ducks on the Gulf Coast and in Florida). As a group, diving ducks are overlooked by many JVs. Concern was expressed by some JVs and Flyways that the Plan may be too "mallard-centric".

Further work is also required to identify important migration and wintering habitats of some geese and sea ducks in non-agricultural landscapes, e. g. coastal areas and marine habitats. Concerns were expressed that some habitats have not been adequately addressed and their role in supporting continental waterfowl populations is poorly understood (molting habitats, mid-latitude staging areas, spring migration habitats and areas outside of existing JVs such as northern Canada and Mexico). The role of these habitats should be evaluated and action taken, as necessary, to secure key areas.

6. New Challenges

The PC must plan for emerging challenges that will face waterfowl and habitat conservation in North America in the next decade, including the impacts of global climate change on prairie wetlands and coastal ecosystems, and increasing development in the boreal forest. Few JVs have actively addressed these challenges in their planning process. One JV commented that "it may be doubtful whether our JV will ever see environmental conditions of the l970s again. As our climate changes, will Plan continental goals change?" Conservation in the Canadian and U. S. boreal forest remains largely unconnected to the Plan Community despite the significant biological importance of the boreal to North American waterfowl. The PC should solicit and

support independent and (or) NSST studies of these broad-scale challenges, and advise JVs to consider these issues in conservation plans.

Our understanding of socio-economic drivers of land-use decisions is limited and represents a critical area for learning. The Plan Community is also in its infancy in terms of being able to place value on natural capital and ecological goods and services, despite the widely recognized and critical ecosystem services that wetlands provide. There may be considerable opportunity for JVs to engage non-traditional partners in wetland conservation as societal recognition of these benefits grows.

Numerous other issues face Plan partners – disease, invasive species, and contaminants – yet many JVs express uncertainty as to what actions might be taken to deal with these challenges. Strategic planning at regional and continental levels will be required to provide a cohesive approach for dealing with such large-scale and potentially long-term influences. A revitalized NSST must be charged with the task of planning for the effects of climate change, valuing natural capital, understanding linkages among major biomes and furthering our ability to assess socio-economic drivers of land-use decisions.

B. ADAPTIVE PROCESSES

1. Adaptive Management

Only a small number of JVs have fully embraced adaptive management to evaluate programmatic or policy actions. For some JVs, adaptive management is interpreted simply to mean that some level of monitoring is undertaken. For others, adaptive management represents 'science-based' planning, yet the science and the planning remain separate, wherein science "informs" planning (a unidirectional flow of information). In true adaptive management, science and planning are inseparable; management or policy hypotheses are tested through implementation; the new knowledge gained through evaluation of management or policy "experiments" informs the next iterative cycle of planning and implementation.

The 1998 and 2004 Plan Updates provided a strong message to the Plan Community on the utility and importance of adaptive management. The fact that many JVs continue to struggle to implement such an approach is a clear message that greater support for adaptive management – at a JV to continental scale – must be provided by the PC, including recognition of the value of management or policy 'failure' when such experiments actively advance understanding. For Plan resources to be used most effectively, adaptive management must become a standard operating model for all JVs.

2. Strategies for Monitoring and Evaluation

A concerted effort, at a national scale, is needed to develop a strategy and funding to support widespread adoption of adaptive management frameworks that explicitly link planning with subsequent monitoring, evaluation and re-planning in an iterative process. Habitat JVs often

lack the desire to invest limited resources in evaluation. There has also been reluctance of the Plan Community to use existing funds or develop other forms of support for monitoring and evaluation of JV activities, deferring instead to the JVs to undertake this critical function. As a result, commitment to monitoring and evaluation is highly variable among JVs. Some (such as the PHJV, GCJV and LMVJV) have invested considerably since their inception whereas others have only started to do so. Several JVs stated they simply did not have the necessary resources for evaluation and felt the PC, NAWCA Council or JV management boards were not interested in providing support for these efforts.

Given the growing uncertainties facing waterfowl and wetland resources, and the apparent desire to link habitat conditions to population response metrics, monitoring and evaluation can no longer be considered discretionary or low priority. There must be a genuine recognition and acceptance by the entire Plan Community that evaluation is essential to improve the effectiveness of Plan investments. Evaluation efforts must be strongly anchored to on-the-ground management or policy efforts, and resources should be allocated to areas where uncertainty about the effectiveness of management actions is greatest. The lack of comprehensive evaluation program has left Plan partners vulnerable to the criticism that, despite 20 years of unprecedented effort, the influence of NAWMP accomplishments on waterfowl populations cannot be clearly ascertained.

The role of strategic evaluation for waterfowl conservation was a central focus of the 2004 Update (which also included examples illustrating how evaluation efforts have improved the cost-effectiveness of habitat programs). However, efforts to move forward on this directive have been stymied by a lack of institutional support and resources. A dedicated source of funds, linked to Plan projects and available through competitive grants, is needed to provide the impetus. These funds should be available on a continuing basis such that JVs could plan long-term evaluation efforts.

We envision several possibilities by which such support could be generated. One mechanism would be to apportion a fraction of all NAWCA grants to monitoring and evaluation. The NAWCA Council has been reluctant to allocate funds to evaluation that could instead be used for habitat acquisition, restoration and enhancement (i.e., on-the-ground projects). However, even a relatively small expenditure on evaluation could make significant inroads in the ability to determine whether the on-the-ground efforts have any detectable influence on waterfowl populations. Consider, for example, if one less NAWCA project was funded every other year (assuming a grant of $½-1 million), up to $250,000 –500,000 would be generated annually, funds which could then be used to determine whether the remaining $35–40million expended each year on habitat projects was being used effectively. NAWCA Council did offer a grant program to support evaluation for a single year (99-00); although many JVs felt that this effort was highly successful, the program was not continued. A second mechanism would be for the USFWS to reprogram some of the 1234 funds; rather than allocating all of the funds each year, some portion could be held back and used for NSST-directed evaluation projects. State wildlife funds provide another possible source of support for critical evaluation needs. Whatever the mechanism, it is clear that if the NAWMP Community truly desires to improve the biological foundation of the Plan, a significant effort must be made to develop a continental strategy and funding to support monitoring and evaluation.

Finally, our ability to simply document the loss or gain of wetland habitats will be itself severely challenged. Many JVs in the U.S. rely heavily on NWI mapping data that are now 35 years old, expensive, and slow to acquire. There is concern that the NWI is becoming a lower priority in the USFWS budget, yet there is a continuing need for updated NWI data. Likewise, support is needed to develop and maintain complementary mapping efforts in Canada and México.

3. JV Assessment

A common message delivered by many JVs and Flyways was that an effort to assess Plan programs was a necessary and important undertaking and should be conducted on a regular basis. JV partners benefit considerably from the lateral sharing of ideas with other JVs and from the efforts to systematically review their own accomplishments, evaluation programs and needs. Such assessments are a critical element in advancing new ideas and adaptive management throughout the Plan Community.

We received several suggestions as to how to improve this process, including:

(i) conducting continental assessments (such as the current effort) every 5-10 years, with more informal assessments of each JV at shorter intervals;
(ii) requiring technical updates/annual reports from JVs, perhaps incorporating these reports with other updates and accomplishment reports;
(iii) establishing a set of criteria or benchmarks (minimum standards) for JVs to use in assessing their own accomplishments and needs; and
(iv) using the results of continental assessments as a means to readjust and align geographic priorities under the Plan.

Regardless of how future assessments are conducted, it was clear that JV partners felt the current assessment was valuable. A few of the JVs commented that the assessment process was the first time they felt the PC had expressed an interest in what JVs were trying to accomplish. Although we were careful to point out that our task was not to give each JV a scorecard, many stated that a scorecard would, in fact, be welcomed.
We have provided initial guidance in this respect by providing a summary of the qualities that, in our opinion, characterize highly effective JVs (Appendix F).

It is important to note that this was intended to be a “high level” look at the entire NAWMP effort. Although we interviewed all of the JVs and received much information from them, we had limited time to devote to each one. Therefore, even though we are responding individually to each JV *via* separate reports, we recognize that our advice will be based on a relatively limited examination of each JV. On reflection we think that all JVs could benefit from a thorough periodic peer review of their biological foundations and conservation strategies – much like any academic or government research institution benefits from independent peer review. New eyes looking at old problems can often lead to innovative ideas, and we encourage JVs to seek such advice at regular intervals as a matter of normal business.

4. Tracking Accomplishments

Continued development of a tracking system to measure the success of Plan efforts is a priority. Additionally, as the biological foundations of the Plan are strengthened, thought must be given to how we might operationally evaluate Plan success in influencing vital rates or population sizes. This will be a more complicated task and will be predicated by the ability of planners to develop measurable targets for key vital rates or regional population objectives.

JV partners also stressed that efforts in the policy and extension arena are critical to Plan success and a method to track and evaluate these accomplishments is necessary. This represents a new dimension to assessing JV success and strategic direction in developing these guidelines is needed. Finally, it is important to recognize that the goal of any tracking effort is not only to provide accountability, but also to provide a format by which success can be shared among the Plan partners.

C. CONSERVATION STRATEGIES USED IN MEETING NAWMP GOALS

1. Introduction

Meeting NAWMP population objectives requires that waterfowl managers provide sufficient habitat at all stages of the annual cycle. Since 1986, NAWMP partners have relied on a diversity of conservation strategies to meet the needs of North American waterfowl. Although often related these strategies generally fall into one of three categories; 1) Intensive habitat programs, 2) Extensive habitat programs, and
3) Policy. Here we examine the use of these strategies and offer some conclusions about their roles in meeting NAWMP goals. Where possible we contrast the use and future application of these conservation strategies in breeding vs. non-breeding areas. These strategies are defined below.

Intensive Habitat Programs typically provide substantial funds for protection, restoration, enhancement, or maintenance of habitat on private and public lands where public agency and/or NGO dollars are invested directly in the property. The Wetland Reserve Program (WRP) and NAWCA are example of public source dollars that support intensive habitat programs and which have wide recognition in the Plan Community. The cost per acre of these programs is typically high.

Extensive Habitat Programs promote land use changes for the benefit of waterfowl through the provision of information or on-site demonstrations to landowners. Though extension programs may be coupled with payments that offset or recognize the costs of converting to waterfowl-friendly practices, the cost per acre of these programs is typically low in comparison to intensive habitat programs. Demonstrating the economic viability of winter wheat in the Canadian prairies is an extensive program aimed at increasing nest success on a large scale.

Policy includes efforts that diminish the risk of habitat loss and/or support the restoration of habitat by influencing government legislation, regulations, and appropriations. Two types of policy initiatives are recognized:

a) Policy initiatives that provide support for intensive programs. These include policy efforts directed at federal, state, or provincial programs (e.g. WRP, NAWCA) where NAWMP partners attempt to increase funding for these programs or how they are administered.

b) Policy initiatives that provide support for regulatory programs where NAWMP partners attempt to influence how regulatory programs are administered or interpreted by lead public agencies (e.g. administration of the Clean Water Act). For the purpose of this report we also include quasi-regulatory programs that are tied to provisions of the Farm Bill (e.g. Swampbuster provision that denies payments to landowners who degrade wetlands).

Funding for programs like NAWCA is strongly tied to the goals of the NAWMP. However, NAWMP partners have relied on several programs that were originally developed with little or no connection to the Plan. Perhaps the best known examples are WRP and CRP. These intensive habitat programs were developed as conservation provisions of USDA Farm Bills. Despite the original intent of these programs, the Plan Community has invested considerable effort in maintaining WRP and CRP and in having them administered to the benefit of waterfowl.

Table 6 includes some key programs used to meet waterfowl needs and categorizes these programs based on program type and intent. Program intent refers to the original purpose of the program. Programs that were specifically developed in support of the NAWMP are considered directly related to Plan goals in their purpose and intent. Programs that were not specifically developed in support of the Plan but which have proved important in meeting Plan goals are considered indirectly related to the NAWMP in purpose and intent. NAWCA represents an intensive habitat program where program intent is directly related to NAWMP goals, though NAWCA has also funded extensive programs in both the U.S. and Canada. The U.S. Fish and Wildlife Service's easement program to permanently protect wetland and upland resources also represents an intensive program. Although this program pre-dates the NAWMP, its intent is directly related to Plan goals. The CRP represents an intensive program where program intent is indirectly related to NAWMP goals. Finally, policy includes efforts to support funding for programs directly related to the NAWMP (e.g. NAWCA appropriations) or to influence programs that are indirectly related to Plan goals. This includes the administration of regulatory programs like the Clean Water Act that affords federal wetland protection in key waterfowl regions. The remainder of this section reviews the conservation strategies used in breeding and non-breeding areas since 1986, and offers recommendations on the role of intensive programs, extensive programs, and policy as the Plan moves forward.

Table 6. Examples of conservation strategies based on program type and intent.

Conservation Strategy	Directly Related to NAWMP Goals	Indirectly Related to NAWMP Goals
Intensive Programs	• NAWCA •USFWS Easement Program	•CRP •WRP •National Coastal Conservation Act
Extensive Programs	•Winter wheat demonstration projects in Canadian PPR •Winter-flooding of harvested grain	•None known
Policy	• Congressional support for NAWCA	•Congressional support for WRP & CRP •Maintain wetland protection under Clean Water Act

Program Intent

2. The Role of Intensive Programs, Extensive Programs, and Policy in Meeting Plan Goals

A. Migration and Winter Habitats

JVs that support large numbers of migrating and wintering waterfowl have relied heavily on intensive programs, both directly and indirectly related to NAWMP goals, to meet bird needs outside of the breeding season. Although federal wetland programs have been widely applied in non-breeding areas (e.g., WRP, NAWCA, Coastal Wetlands Planning, Protection, and Restoration Act), state programs have also provided significant resources for wetland conservation. Public dollars have been further stretched by NGO efforts to leverage intensive programs with private funds. These public – private partnerships have provided substantial capital for wetland conservation in many non-breeding areas.

Extensive programs that promote waterfowl- friendly farming practices have also produced substantial habitat gains in non-breeding areas, especially in rice growing regions of the U.S. For example, winter-flooded rice in the Central Valley has increased from 50,000 acres in the 1970s to over 300,000 acres today. Extensive programs that positively affect waterfowl and farming activities and provide additional farm income have been widely accepted in many non-breeding areas. Winter flooding of rice in the Central Valley, Gulf Coast, and Mississippi Alluvial Valley has reduced soil loss, provided a means of decomposing rice straw, and generated additional farm revenue through leases.

Policy efforts undertaken by Plan partners in non-breeding areas have largely focused on increasing funding for intensive programs. Attempts to increase NAWCA funding or influence conservation provisions of the Farm Bill are widely recognized examples of this type of policy initiative. More recent are efforts to influence regulatory policy that governs federal protection of wetlands. This has resulted from a Supreme Court decision that narrows interpretation of the Clean Water Act, and removes federal protection of many "isolated wetlands" that are important to waterfowl. Finally, JVs in some non-breeding areas have become increasingly concerned about wetland water supplies and regulatory decisions that govern the diversion and distribution of water.

In general, the conservation strategies used by Plan partners to meet the needs of migrating and wintering waterfowl appear to be providing progress in developing landscapes that can support 1970's population levels. The Plan Community's success in accessing habitat programs that are both directly and indirectly related to the NAWMP is especially notable, as is the development of farming practices that are beneficial to waterfowl and landowners alike. Some Joint Ventures that support a significant fraction of the continent's wintering waterfowl now report habitat conditions that can meet Plan goals in all but the driest winters (for more detail see Section III. Results).

While JV strategies in non-breeding areas have produced meaningful progress in meeting the needs of wintering and migrating waterfowl, challenges remain. Much of the gain in foraging habitat has resulted from extensive programs (e.g., winter-flooded cropland) that do not provide long-term protection. Changes in the farm economy that shift landowners away from waterfowl friendly practices or convert cropland to other uses can reverse some of the gains in non-breeding areas. Changing farming practices can also have substantial effects on waterfowl. Early maturing varieties of rice in the Mississippi Alluvial Valley have resulted in significantly less waste rice for wintering waterfowl. While intensive programs often lead to permanently protected habitat, protecting enough habitats to meet the needs of non-breeding waterfowl remains a serious long-term challenge.

B. Breeding Habitats

Ducks on the breeding grounds are typically dispersed at low densities. However, in parts of the prairie region particularly the Missouri Coteau, breeding duck densities over 80 pairs per square mile are not unusual. Territoriality and other duck spacing mechanisms mean that waterfowl management aimed at increasing duck production must occur on vast acreages.

JVs that support large numbers of breeding waterfowl have also relied heavily on intensive programs to meet waterfowl needs, including those directly related to NAWMP goals. In the U.S. prairies purchased easements that perpetually protect upland and wetland habitats that remain in private ownership have been widely applied. Most of these easements were purchased with Migratory Bird Conservation Funds (MBCF) prior to the Plan, though NAWCA dollars and matching funds provided by NGO's have become increasingly important in recent years. This is

especially true in North Dakota where state law restricts the use of MBCF funds for certain easements purchases.

Since 1986, the CRP has converted more than six million acres of cropland to idle grass cover in the U.S. Prairie Pothole region at an annual cost of nearly 200 million dollars. Most of these croplands were converted to grass under 10-year agreements that provide annual incentive payments. While CRP did not result from the Plan, the waterfowl community has devoted substantial effort to maintain this program in successive Farm Bills. Much effort has also been made to retain the Farm Bill's Swampbuster provision that provides economic incentives for wetland conservation. The importance of these two USDA programs is widely recognized by waterfowl managers, and lobbying efforts that support CRP and Swampbuster have been critical to meeting Plan objectives for the U.S. prairies.

Breeding waterfowl populations of the mid and late 1990's suggest that habitat programs on the U.S. PPR have resulted in a landscape capable of meeting NAWMP goals. However much of this progress is attributable to CRP, a Farm Bill provision where program intent is indirectly related to NAWMP goals and where gains in upland habitat will be reversed if the program is eliminated or substantially reduced in the U.S. PPR. Intensive habitat programs that are directly related to Plan goals have, on their own, been unable to achieve net gains in upland cover in the U.S. PPR given the ongoing conversion of native grassland to cropland. This is a serious concern given suggested changes to CRP (for more detail see Section III. Results).

Finally, changes to the Clean Water Act require new efforts by the Plan Community to influence federal regulatory policy for wetlands. Over 90% of wetlands in the U.S. PPR may no longer be afforded protection under the Clean Water Act as a result of a 2001 Supreme Court's decision that questioned federal jurisdiction over "isolated" wetlands. Plan partners have responded on both the political and scientific front by arguing that interpretation of the Clean Water Act must recognize that few wetlands are hydrologically "isolated", and that loss of these habitats will seriously reduce the reproductive capacity of ducks in the U.S. prairies. In 2002 and 2006 the U.S. Supreme Court rendered decisions that created remaining doubt about the status of protection afforded by the Clean Water Act.

In the Canadian PPR, implementation planning by the PHJV in the late 1980s focused on delivery of intensive programs in each of the Prairie Provinces that were directly related to NAWMP goals. The intent was to jump start waterfowl production through intensive programs like fenced nesting cover, while recognizing the need for policy efforts and extensive programs that provided landscape level solutions to low nest success. Fenced nesting cover quickly gave way to other intensive programs, especially purchase of farmland and restoration of nesting cover. Since 1986, Plan expenditures in prairie Canada have resulted in the permanent protection of nearly 500,000 acres of waterfowl habitat, 200,000 of which were formerly cropped. Much of this habitat was secured using a combination of NAWCA and NGO funds.

On the policy front there has been some success in the Canadian prairies, at least partially due to efforts by PHJV partners. In 1995 the federal government in Canada eliminated two different grain transportation subsidies that help move grain from Prairie Provinces toward eastern or western markets. These subsidies had helped make grain production more economically

appealing than cattle production. Elimination of these subsidies has coincided with a 6 million acre decline in cropped land since 1986 with most of these acres converted to pasture or hay land. Conversion of cropland to support cattle production has improved the reproductive capacity of these landscapes for nesting waterfowl and has reduced the incentive for wetland drainage on converted properties.

A second policy success in Canada has been establishment of legislation allowing conservation easements in all Prairie Provinces. Until the early 1990s there were no provisions for perpetual easements in the Canadian prairies. Wetland and upland easements have been a long-standing means of habitat protection in the U.S. PPR.

Extensive programs that include grazing systems, delayed haying, and flushing devices on farm equipment have also been widely used conservation efforts in the Canadian prairies. While these programs proved to have modest incremental production value to waterfowl, more recent efforts like fall-seeded crops offer significant potential for increasing waterfowl production in cost effective manner that is integrated with the farm economy.

Although Plan partners have relied on a diversity of conservation strategies to meet waterfowl needs in the Canadian PPR, these programs and policy efforts have not yet produced landscapes capable of supporting 1970's populations. There is widespread recognition that intensive habitat programs including land acquisition, enhancement, and restoration cannot by themselves provide meaningful progress in the Canadian PPR. While intensive programs will continue to have a role in the PHJV, their application will likely be restricted to areas with the highest potential for waterfowl production.

Much of the decline in reproductive capacity on the Canadian prairies is the result of wetland losses that have continued since the Plan's inception. Although elimination of grain subsidies represents a policy success on behalf on upland habitats, policy efforts that halt the ongoing loss of wetlands in the Canadian PPR are badly needed and are being pursued by PHJV partners.

While breeding waterfowl needs on the U.S. and Canadian prairies are ultimately the same, social and economic differences between the two regions will probably dictate different conservation strategies to achieve success. Intensive programs in the U.S. have proved successful in providing a landscape capable of meeting Plan goals, though much of this success is due to CRP, a Farm Bill provision where the original program intent was largely unrelated to the NAWMP. In contrast, Canada's tax base is unlikely to support a CRP style program given the expense of delivering an intensive program on a prairie scale. More likely are extensive habitat programs where farming practices are changed to the benefit of waterfowl (e.g. increased acreages of winter wheat) or where society recognizes and compensates landowners for the ecological goods and services these landowners provide, including waterfowl habitat.

Despite these differences the U.S. and Canadian PPR share an important and critical similarity. Policy efforts, whether it be in support of intensive habitat programs like CRP or more extensive programs that recognize the value of ecological goods and services, will be crucial to the Plan's long-term and lasting success. However, policies change and the challenge to maintain policy

favorable to waterfowl in the U.S. and Canadian prairies is likely to be perpetual and without a finish line.

3. Recommendations for the Future Role of Intensive Programs, Extensive Programs, and Policy in Meeting NAWMP Goals.

A. Migration and Winter Habitats

1) Intensive programs, both directly and indirectly related to NAWMP goals, should continue to play a major role in meeting waterfowl needs in non-breeding areas. These programs should be delivered at a scale that ultimately reduces our reliance on unprotected agricultural habitats, and incrementally increases the amount of protected foraging habitat available to waterfowl.

2) Policy efforts that maintain or increase funding for intensive programs, especially those that lead to the restoration and or protection of natural wetland habitats, should continue to be a priority for Plan partners in non-breeding areas. This includes programs that are indirectly related to NAWMP goals, but which have provided substantial funds for wetland restoration and protection since 1986.

3) Agriculture habitats will remain important in meeting the needs of non-breeding waterfowl in the foreseeable future. Although agricultural markets are beyond JV control, Plan partners should continually seek overlap in farming practices that are economically appealing and benefit waterfowl. These extensive programs should be concurrent with intensive programs that provide net gains in protected natural habitats.

4) Decisions that govern the distribution and pricing of water supplies are becoming increasingly important to wetland managers in many non-breeding areas. Where possible, Plan partners should be actively involved in policy decisions that affect wetland water supplies for wildlife.

5) Changes to the Clean Water Act have resulted in the loss of federal wetland protection for many U. S. wetlands. Plan partners should seek to restore federal protection for all wetlands in all non-breeding areas.

B. Breeding Habitat

1) Efforts that maintain CRP on the U.S. prairies should be a high priority for Plan partners. Even partial loss of CRP in the U.S. PPR will reverse net gains in upland cover that have occurred since 1986. Outright loss of CRP would reduce grassland habitat to a level not yet seen in the U.S. prairies.

2) Easement programs that provide permanent protection for wetland and upland habitats in the U.S. PPR have protected nearly one million acres since 1988 alone. Increasing the scale of these intensive programs should be a priority.

3) Plan partners should consider policy disincentives for converting native grassland to cropland in the U.S. prairies. Easement programs that permanently protect native grassland cannot keep pace with current rates of grassland conversion.

4) Changes to the Clean Water Act have left the majority of wetlands in the U.S. PPR without protection. Plan partners will have to continue to work to maintain the Swampbuster provision of the Farm Bill. However, policy efforts to restore federal protection of isolated wetlands in the U.S. prairies are ultimately needed.

5) Intensive programs that involve site-specific interventions including land acquisition, enhancement, and restoration cannot by themselves provide meaningful progress in meeting waterfowl needs within the Canadian PPR. The region is simply too large. Intensive programs will continue to be used by the PHJV with a focus on areas with the highest potential for waterfowl production. Intensive programs that restore small wetland basins may be especially important as declines in breeding waterfowl carrying capacity on the Canadian prairies are largely due to the loss of these basins.

6) Policy efforts that increase protection for wetlands in the Canadian PPR are badly needed to stem the continuing loss of waterfowl reproductive capacity.

7) Extensive programs that positively affect both duck production and farm income are needed to fundamentally address the inadequacy of habitat in Prairie Canada. Programs that advocate conversion to winter cereals and incentive payments that recognize the ecological goods and services that are provided by conservation-minded landowners are two such examples. Although the Plan Community has frequently identified the need for a "CRP type program" in the Canadian prairies, the likelihood of a comparably large set aside program is very remote. Canada's tax base is too small and there is little interest in the agricultural community for removing large acreages of production agriculture. The Canadian PPR is largely the responsibility of private landowners and solutions to the duck problem will ultimately have to be found in the context of working farms.

D. INSTITUTIONAL ISSUES

1. Leadership by the Plan Committee (PC)

The visibility of the Plan Committee and the connectedness of the Plan Community have waned in recent years. Going forward, the PC needs to exercise more effective leadership for the Plan nationally and internationally, and we believe that the Plan Community will be receptive. A central message from virtually every JV and Flyway was that greater input and strategic guidance from the PC and the NSST was desired. This was particularly true for newer JVs and those that have only recently developed their strategic planning documents; however, even some of the established JVs with strong science frameworks expressed concern that they did not receive sufficient direction or feedback from the PC. A simple action that should have immediate positive impacts would be for the PC to work with JVs and others to strengthen regular two-way

communication about accomplishments, priorities, biological foundations, and other strategic matters. Nearly everyone with whom we met also wants to see stronger integration of Plan efforts among the PC, NSST, JVs, laterally among the JVs, and with the Flyway Councils and the Canadian Wildlife Directors.

The PC needs to serve both leadership and integrative management roles, building on the revised PC functions articulated in the 2004 Update (Appendix G) and strengthened through renewed dialogue with the JVs. Because of diminished dialogue, many JVs appear to have simply lost track of what roles the PC is playing.

The PC needs to lead development of a clearer and more robust accountability framework for the achievement of Plan objectives involving all organizational levels in the Plan Community. This was a recurring substantive theme during our inquiries. A strengthened accountability framework would reconnect Plan objectives with the bodies responsible for Plan delivery at continental, national, regional (JV), and sub-regional (state, province, focus area) scales. We urge that the PC and JVs work together to design this framework as soon as possible. Although we do not know exactly what such a framework will look like, it will necessarily include articulation of substantive responsibilities at each organizational level and regular two-way communication respecting accomplishments, progress on biological foundations, and other matters of strategic importance to the achievement of Plan goals. Formal written communications will be central to a stronger accountability framework, but face-to-face contact, coincident meetings, and the like may be helpful as well. Enhanced communication is even more critical now as JVs encounter broadened mandates involving other conservation initiatives (e.g., NABCI).

The PC needs to provide strategic direction to the NSST and help ensure that the NSST is achieving its objectives and serving the needs of the entire Plan Community. This will require increased dialogue with the NSST and increased efforts by the PC to ensure that the NSST has the staff and financial resources it needs to carry out its work. Nurturing the work of the NSST, in combination with sponsoring periodic forums on topics of strategic importance to the Plan, presents major opportunities for the PC to add value to the regional work of the JVs. The PC should advocate for the Plan more actively in a wide variety of conservation forums.

Finally, when the work elements listed above have been well characterized, the PC should review whether it has the right structure, focus, expertise, and the capacity to fulfill its expanded leadership functions.

2. The NAWMP Science Support Team (NSST)

Across the Plan Community there is broad support in concept for the NSST, but disappointment about what it has been able to accomplish since its work on the 2004 Update. We believe that the primary functions of the NSST as articulated in the 2004 Update remain sound, namely:

- Provides technical input and recommendations to the PC on Plan implementation;
- Facilitates identification of methods for biological planning and for evaluation of Plan performance at regional and continental scales;
- Acts as forum for discussion and integration of biological planning and evaluation at multiple spatial scales;
- Facilitates technical information exchange and reporting;
- In collaboration with JV technical committees, helps identify and communicate data, monitoring, assessment and research needs to the U.S. Geological Survey, academia, the U.S. Fish and Wildlife Service, Canadian Wildlife Service, and other Plan partners;
- Reports to the PC and other Plan partners on the status of Plan biological foundations, evaluation results, and implications for future conservation activities.

The membership, involving federal wildlife management agencies, JV and Flyway representatives, as well as the flexibility to recruit university and non-government partners as needed seems generally appropriate but would benefit from a review once its future work plans are established.

The NSST must become much more active, however, with greater engagement of its JV and Flyway partners. In particular, there are important technical matters at spatial scales larger than JVs that are unattended; there are matters of integration with harvest management (currently being elucidated by the JTG) that will require additional work (e.g., new approaches for translating continental population objectives to JV habitat goals); there are issues around population goals and the next Plan Update about which the PC requires technical advice; and there are many technical matters common to multiple JVs (e.g., performance metrics for non-breeding JVs, inter-JV research coordination) for which the NSST should serve as the key focal point for developing solutions.

The NSST ought to be involved routinely as a critical conduit between the JVs and the PC for reports on biological accomplishments, and serve as a source of technical advice for both the PC and the JVs. Importantly, we believe that the NSST should be engaged in regular future assessments of Plan biological progress.

To provide strong leadership and timely products, it has become very clear that the NSST needs greater human and financial resources to advance its work. When the PC created the NSST in late 1999, the proposal (Anderson et al. 1999) included a prospectus for dedicated staff and funding to enable meetings, support short-term analytical work that the NSST might commission, and the appointment of national coordinators to ensure momentum and continuity of efforts between meetings of the full NSST. As currently constructed, however, the effectiveness of the NSST is limited because members have other full-time jobs. The ability to meet only irregularly further challenges the NSST to fulfill its mandate. The PC should consider working with federal funding sources to establish a few fully supported positions – with operational funding – to enable the NSST to successfully support the Plan Community. This has been done for harvest management in support of the AHM Working Group; the need here is just as urgent and the mission arguably even more important to waterfowl conservation.

However it might be accomplished it is clear that more resources are needed for the NSST to fulfill its mandate – a mandate that has widespread support and high expectations across the Plan Community.

3. The Joint Ventures (JVs)

The JVs have proven to be one of the most important legacies of the original 1986 North American Waterfowl Management Plan. Everywhere we looked, highly motivated people were working to deliver waterfowl and wetland conservation programs. These dedicated people are clearly the heart and the greatest strength of the NAWMP enterprise. Their passion is palpable and their dedication exemplary; it was a privilege to meet with them and share in their work.

The JVs have evolved considerably and now include a diversity of organizations, institutions, and approaches to conservation. Many have made substantial progress in pursuing their biological objectives whereas others are still uncertain about their basic biological foundations (see Appendix F for guidance on JV technical matters). Strong linkages between technical and management committees, and between JV management committees and state/provincial focus area teams, are essential in our opinion, but such linkages were not always evident. Engagement of stakeholders also varies greatly among JVs. For instance, agricultural organizations or landowners have joined some JVs with helpful consequences; other JVs may benefit from similar initiatives. The diversity of JVs has evolved, in part, due to the unique characteristics of each region and the requisite local partnerships. This is a JV strength, provided that each JV is well-grounded biologically and there is accountability for JV performance.

As discussed above, JVs need to re-connect with the PC and the NSST to strengthen the framework and strategic integration of Plan conservation efforts. Nearly all JVs we met with also recognize the value of strong connections with other JVs to share information and experiences and solve mutual challenges. Staff interchanges, site visits, periodic workshops or symposia are some ways that JVs could learn more from one another and these should be undertaken.

Several habitat and species JVs share common interests, species and geography. In some cases, the connections between species and habitat JVs should be strengthened. Lack of complementary missions, strategic focus and programs could be a source of inefficiency and perhaps missed opportunities. Specifically, we encourage strong connectivity between the Black Duck, Eastern Habitat and Atlantic Coast JVs. Similarly, connections between the Sea Duck JV and the coastal JVs (Pacific, Atlantic, San Francisco Bay, and Great Lakes) could be strengthened; likewise for the Arctic Goose JV and its related habitat JVs. Closer connections appear to be forming between the newly-developed Pintail Action Group (PAG) and its related habitat JVs whose technical groups were instrumental in the creation of the PAG.

Connections between JVs (often set up with strong federal leadership) and their constituent states and provinces are sometimes weak. We encountered examples of this in Canada and the U.S. We heard related concerns about inadequate communication between JVs and Flyway technical committees in some regions. Improved integration with state/provincial agencies may be

beneficial for aligning resources in pursuit of Plan goals and we urge that JVs explore these fully.

The U.S. federal infrastructure support for JVs has proven to be very helpful for advancing biological planning. Individual JVs have used these new funds in various ways and we should learn more over the next few years what characterizes a productive balance of investment in staff vs. operational monitoring and assessment. Already it is apparent, however, that some JVs have invested so much in staff that they have little or no incremental ability to conduct needed monitoring and assessment. In those cases some reassessment of investment patterns may be necessary. JVs in Canada and emerging regional partnerships in Mexico could benefit greatly from parallel federal programs in those countries.

4. Flyway Councils and State/Provincial Wildlife Directorates

Some participants in the Flyway Council system, particularly technical people, feel inadequately connected to the Plan and the JVs. We believe that synergies related to planning, monitoring and assessment might arise from stronger connections between JV and Flyway technical working groups. Although we did not poll them specifically, our sense from the Canadian JVs is that connections with provincial wildlife directorates is also quite variable and might be profitably strengthened. At the very least, the programs of NAWMP and these other entities ought to be transparent to one another and complementary. Coordination of objectives between Flyways and JVs is one area requiring constant attention. In the future, greater coherence and stronger linkages in the objectives of harvest and habitat management programs should make these connections even more important.

5. NAWCA, the NAWC Councils, and New Sources of Financial Support

U.S. federal support through the NAWCA and non-federal U.S. matching funds remain critical to conservation progress under the Plan in Canada, Mexico and the U.S. At the same time, sideboards on NAWCA funding limit their utility to Plan partners, especially in breeding JVs that are critical to many duck populations. In particular, as the JVs have realized that more mission-critical work is needed in public policy, education, and research there is frustration with the absence of major funding sources for such work. It is important that the PC and its JVs maintain a strong dialogue with the NAWC Councils around the needs of the Plan partnership, particularly now as the Act is undergoing renewal in Congress. Simultaneously we think it is vital for the Plan partners to find new, complementary sources of substantive financial support for NAWMP programs that are presently not NAWCA-eligible.

Moving geographically portable resources to areas of greatest potential impact is also challenging. One option might be to allow a lower non-federal: federal match ratio for NAWCA grants to the PPR, or consider allowing Canadian-source matching dollars to leverage U.S. federal funds for the PPR in Canada.

As the Plan Community strengthens its accountability framework and reporting mechanisms, we think it is vital that PC also creates and maintains a related stream of communications with the NAWC Councils in both Canada and the United States. The Plan Community can only expect the Councils to be responsive to NAWMP needs if Plan partners are actively communicating those needs, accomplishments and opportunities to the Councils.

E. INTEGRATION OF NAWMP WITH ALL-BIRD CONSERVATION

The 1986 NAWMP recognized that its broad policy framework and landscape level conservation strategy would benefit a wide array of species other than waterfowl. The assessment of the first five years of the Plan (U.S. Fish and Wildlife Service and Canadian Wildlife Service, 1993) recognized that the early success of the Plan was due to the synergy facilitated by the Joint Venture model, and that many partners joined for purposes broader than, but complementary to, waterfowl population and habitat improvement. This success encouraged the development of similar efforts for conservation of other bird groups, and the North American Bird Conservation Initiative (NABCI) was one of the outcomes. The 1998 Plan Update specifically recognized these developments and recommended the integration of all birds into the planning framework for Joint Ventures, while emphasizing the continued waterfowl focus of the Plan itself. Recognition and identification of differences in habitat requirements through specific planning for other bird groups facilitates integration and fine tuning of management actions at the local level (e.g., Integrated Bird Conservation). The PC also indicated in the 1998 Update that while other groups would lead all-bird planning, on-the-ground planning should be coordinated at the JV or local level. To facilitate this, the JVs were encouraged to undertake Integrated Bird Conservation and their internal staff resource allocation has reflected that change.

Initial concerns about the addition of non-waterfowl species to JV responsibilities included two major themes. The first was the concern that money formerly directed to waterfowl management would be diverted to conservation of other bird groups. A second concern was about technical capabilities and the ability to deliver on such a broad mandate. A third concern has emerged now that the JVs are moving ahead on their all-bird mandate and this is, expressed as loss of focus of the JVs on the waterfowl objectives.

While most JVs identified waterfowl as their clear priority, some have incorporated all birds to a very large extent at the planning level (e.g., PPJV has detailed plans for landbirds, shorebirds and waterbirds; ACJV has an all-bird technical committee that parallels its waterfowl technical committee). Some JVs have incorporated all birds in a more general manner, but have not developed specific planning frameworks, opting to let other bird conservation groups or joint agency working groups take the lead (e.g. BCR level planning in the EHJV area). Many of those interviewed indicated that JVs are losing focus due to the integration of all bird objectives without concomitant additional resources and identified this as a major problem in achieving waterfowl habitat objectives. The solution offered was more accountability of inputs from each bird group and of benefits accruing to each (and of course, more money). Development of on-the-ground management activities for all birds has proceeded at a slower pace among most JVs.

Although Integrated Bird Conservation is fundamentally accepted by the Plan Community according to our interviews, the concern about diversion of money persists among some JVs and Flyway Councils, particularly because no large scale funding mechanism has been developed for other bird conservation initiatives. In this review, most Flyways expressed strong concern that all-bird initiatives and the delivery of projects to benefit multiple bird groups should not be funded by dedicated NAWMP funds for waterfowl (habitat) conservation. There was a concern that NAWCA project proposals for waterfowl habitat conservation may be disadvantaged because of the requirement for an all bird component. There is a sense in the Plan Community that diversion of funds to other bird groups will be detrimental as long as significant waterfowl habitat objectives remain unachieved. The need for significant input of new and non-competing resources enabling on-the-ground habitat conservation actions for birds other than waterfowl and wetland-obligate species remains a high priority for the Plan Community and its other bird conservation partners. Comprehensive thinking on continental bird conservation needs to occur at a scale higher than or broader than single JVs.

F. FUNDING AND OTHER RESOURCES

A common theme that arose during the assessment process in most JVs was that accomplishments were constrained by the availability of funding and other resources, primarily manpower. When the NAWCA was reauthorized in 2003, the authorized annual appropriation was significantly increased. However, since then, annual appropriations have never achieved the authorized level.

Several JV's and Flyways pointed out that that the systems for allocating funding resources must take into account waterfowl management priorities. Currently, allocation of NAWCA funds among the three countries is on a percentage basis, whereby the US receives 50%, Canada receives 45% and Mexico receives 5%. However, within each of the three countries, different approaches are used to allocate available funds

The topic of funding for administrative support emerged from several JV assessments. In the U.S., increased funding to support JV administration became available in 2002 from the US Fish and Wildlife Service. This increase in base administrative funding supported expansion of existing staff to include science advisers and GIS specialists to support biological foundation issues. A similar increase to Canadian JV's would be very beneficial to bolster core staffing.

Several JV's reported on how the restrictions related to eligible expenditures under NAWCA funding affected accomplishments and effectiveness of program delivery. For example, species JVs such as the Arctic Goose Joint Venture and the Sea Duck Joint Venture are not eligible for NAWCA funding. In addition, under present NAWCA rules, monitoring, evaluation and research are not eligible expenditures. A common theme arising from the assessment was that a significantly improved monitoring and evaluation program was needed, but difficult to fund. We believe that NAWCA guidelines should be altered so that sufficient funds will be made available to monitor and evaluate the success of habitat programs. We strongly believe that such investment in evaluation, while slightly reducing the total delivery of habitat, will more than pay

for itself with substantially faster improvement in the discovery of the habitat programs that maximize improvements in vital rates for waterfowl

Another common theme that arose was the need to expand policy work to advance on-the-ground accomplishments. Current NAWCA eligibility rules do not accommodate policy work. Future Plan successes will depend less on direct habitat securement and more on indirect policy initiatives. Sources of funding to facilitate policy work need to be identified.

The NAWCA expires in 2007 after 15 years and will be up for reauthorization. Through the renewal process, there will be interest and perhaps new competition from other bird groups. The Plan Community needs to be fully engaged in this process from the outset particularly if there is going to be movement and flexibility on the aforementioned rules that presently limit work on monitoring, evaluation and directed studies.

V. PRIMARY CONCLUSIONS AND RECOMMENDATIONS

A. DESIRED OUTCOMES 1 AND 2: ESTIMATION OF PROGRESS TOWARD POPULATION AND HABITAT GOALS; RENEWAL OF REGIONAL AND CONTINENTAL OBJECTIVES.

In a few of the oldest Joint Ventures with the longest history of science support, Plan partners are able to estimate the effects of NAWMP programs and other landscape changes on waterfowl vital rates (e.g., PHJV) or regional foraging capacity (e.g., CVJV, LMVJV), which is assumed to be linked to waterfowl survival or subsequent reproductive rates. At the continental scale and for most individual JVs, however, we were unable to critically evaluate progress toward attaining Plan population objectives, and we were unable to describe with confidence landscape conditions needed to achieve those objectives. This is attributable to two factors: 1) limited ability to assess ongoing net landscape change; and 2) limited knowledge that links landscape composition to waterfowl population dynamics.

Furthermore, there exist unresolved concerns about coherence between harvest management policy and Plan population objectives. Plan managers also need to develop common approaches to setting objectives in the face of uncontrolled environment variation (e.g., annual precipitation). Finally, we observed that habitat JVs currently are inconsistent in their approaches to translating continental population goals into regional habitat objectives.

Therefore, we recommend that:

1) ***The PC should ensure development of a clearer and more robust accountability framework for the achievement of NAWMP biological objectives involving all organizational levels in the Plan Community.*** *(Responsibility = PC guidance; NSST to deal with details with JVs and Flyway Council (FWC) input)*
   A more explicit framework would foster coherence of NAWMP objectives at continental, national, regional (JV), and sub-regional (state, province, focus area) scales and ensure

regular reporting and dialogue among the committees and organizations responsible for Plan implementation. Necessary elements include:

a. ***Better monitoring of key habitat trends such as extent of wetlands (all JVs), nesting habitat (breeding JVs), or foraging habitat (wintering JVs)***. *(Responsibility = JVs with NSST coordination)*
Estimates of habitat gains and losses at landscape scales are essential to estimate true conservation progress and to set appropriate habitat objectives.

b. ***Improved biological understanding of how landscape variation and habitat accomplishments influence waterfowl vital rates.*** *(Responsibility = JVs and NSST)*
Such understanding is essential for describing vision accomplishment, setting meaningful habitat objectives, testing certain critical planning assumptions, and assessing biological progress. Even though inclusion of such metrics in annual evaluation programs may be impractical, research in selected circumstances (e.g., several breeding ground JVs and perhaps one or two of the most important wintering JVs) is essential for developing an informed investment strategy for the Plan. Most breeding JVs ought to be able to learn something on this topic, at least in their most important habitat regions. Such studies are technically more challenging for non-breeding seasons, but JVs should strive to do this cooperatively in a few model systems (e.g., mid-continent mallards or northern pintails?).

c. ***The approaches and assumptions associated with stepping down continental population goals to regional population and habitat goals should be reviewed and revised.*** *(Responsibility = NSST with JVs and FWCs)*

d. ***Improved tracking of habitat accomplishments in many JVs***. *(Responsibility = JVs with national secretariats and NSST review)*
Knowing what the Plan Community has accomplished is essential. Issues to sort out include variation in definitions among partners and JVs, coordination of acreage claims by multiple partners, and responsibility/capacity for aggregating JV-partner accomplishments.

e. ***Development of more informative performance metrics.*** *(Responsibility = JVs with NSST assistance).*
Traditionally, NAWMP accomplishments have been measured in terms of acres of habitat secured, restored or enhanced, and dollars expended. While these may be useful indices of partner activity, they do not directly reflect impacts of human actions on waterfowl populations, or even net change in landscape conditions. We urge the JVs to develop more informative performance metrics that will be more useful for guiding management decisions.

f. ***Enhanced communication, vertically and horizontally among Plan partners around biological objectives, accomplishments and efforts at improving***

biological foundations. *(Responsibility = PC with, NSST, JVs, FWCs)*
Overall, communication among Plan "layers" is weak; there is even considerable confusion about the roles of the PC, NSST, NABCI Councils, the AJVMB, etc. Several JVs opined that more sharing of experiences among JVs would be advantageous too.

2) ***A comprehensive review of Plan objectives should be a high priority leading up to the next Plan Update. (****Responsibility = PC with NSST, FWCs and others)*
Issues that ought to be addressed include what to do about species for which no population objectives presently exist; coherence between harvest and habitat management; planning strategies in the face of annual environmental variation; the strategic balance between protection and restoration objectives; and the ramifications of hunter satisfaction.

B. DESIRED OUTCOME 3: AFFIRMATION THAT ADAPTIVE PROCESSES OF PLANNING, IMPLEMENTATION AND EVALUATION ARE IN PLACE AND ADVANCING THROUGHOUT THE PLAN COMMUNITY

Monitoring and assessment are integral components of management and should be treated as such. It is not sufficient to view these as optional "add on" components to mainstream NAWMP business. Adaptive management is how NAWMP should function.

Some JVs have strong evaluation programs and use them to assess program performance and guide shifts in management actions. However, approaches and relative commitment to science support vary markedly among JVs. To strengthen management decisions, JVs need to make explicit and test their most critical biological assumptions. JVs especially need to reduce uncertainty concerning the linkages between continental population goals and local/regional habitat goals, and between landscape change and waterfowl vital rates. Because of these uncertainties, most JVs still have yet to define the broad landscape conditions necessary to reach and sustain waterfowl populations at objective levels.

3) ***Adaptive management, as the way of approaching NAWMP delivery, needs to be embraced and employed more widely*** *(Responsibility = JVs with PC, NSST, and federal agency support).*

4) ***While technical organizational structures might vary, it is essential that all JVs develop the ability to address basic biological foundation issues (see Appendix F on "Characteristics of Effective JVs").*** *(Responsibility = JVs)*

5) ***Plan progress requires a fundamental commitment to support critical monitoring and evaluation activities, within and among the JVs and through the NSST.*** *(Responsibility = JVs, PC, NSST, national secretariats, and federal agencies)*

6) ***Implementation of the National Strategy for the Management of Waterfowl and their Habitats in Mexico, along with research to help inform further conservation planning,***

should be important priorities for Plan partners *(Responsibility= Mexican national secretariat; research advice from NSST)*

a. There is a need to increase overall NAWMP capacity in Mexico and to initiate longer-term and larger-scale planning. This will require strategic support from the entire Plan Community.

b. Increased monitoring and evaluation efforts in Mexico are needed and Mexico would benefit from a rapid and inexpensive habitat assessment protocol.

c. In general, stronger interactions, idea sharing, and co-training should be developed between Mexico and the NAWMP partners in Canada and the US.

C. DESIRED OUTCOME 4: FUTURE CONSERVATION NEEDS -– IMPROVED GEOGRAPHIC AND PROGRAMMATIC TARGETING OF CONSERVATION INVESTMENTS

For reasons noted above, there are only a few regions where Plan partners can objectively and confidently update their habitat objectives. Experience over the last 20 years, however, suggests that certain approaches enhance effectiveness of the Plan's conservation investments. Therefore, we recommend that:

7) ***Greater progress, and therefore substantially more funding, is needed in breeding areas where waterfowl populations seem to be most limited***. *(Responsibility = PC with NAWCC, government and NGO partners)*
While there is uncertainty about the seasons and regions of greatest limitation for many species, bioenergetic analyses suggest that sufficient food resources are available to waterfowl in several of the major wintering JVs. In contrast, for much of the PPR, in many years, reproductive success remains below levels that can maintain stable populations.

8) ***JV actions should be guided by explicit biological models. This should be the standard planning method in all JVs.*** *(Responsibility = JVs)*
The JVs should use such models to identify clear "endpoints" that will indicate vision accomplishment, recognizing that these will always be dynamic rather than static goals as circumstances and knowledge change with time.

9) ***In biological planning, diving ducks, sea ducks, over-abundant goose species, and species of special concern (e.g., lesser scaup, northern pintails) deserve greater attention.*** *(Responsibility = NSST with PAG, species JVs, FWCs, and habitat JVs)*
Most of the habitat actions under the Plan have been conceived and delivered with dabbling ducks, particularly mallards, in mind. While there were good reasons for this emphasis, there are other species that deserve attention. Even population objectives are lacking for several lesser-known species.

10) ***Global climate change should be given more consideration in JV regional targeting, program emphasis, and project design.*** *(Responsibility = JVs)*

Impacts of sea-level rise are already evident in coastal regions. The western boreal forest and prairie regions are other areas where climate change impacts might be profound. We recognize that uncertainty about future climate predictions increases at smaller geographic scales imposing limits on the spatial resolution of useful climate predictions. Nevertheless, JV planners ought to be able to identify places and programs that are more or less vulnerable to future climatic change and invest accordingly to reduce risk.

11) ***Wetland conservation in the western Canadian and U.S. boreal forest regions should be more explicitly connected to the Plan***. *(Responsibility = PC and JVs)*
Presently, conservation in this vast region is being pursued with little input from the Plan Community. This should change because of the biological importance of the boreal forest to North American waterfowl and the connectivity of the region's waterfowl populations to other Plan priority areas and JVs (e.g., Prairie-Parkland and Boreal lesser scaup). This was recognized in the 2004 NAWMP Implementation Plan but little progress has been made since that Update.

12) ***Increasing engagement in public policy will require development of new funding sources, new expertise, new measures of accomplishment, and new approaches to evaluation. Policy initiatives should be subjected to the same sort of evaluation rigor as is necessary for traditional wildlife programs.*** *(Responsibility = JVs with NSST support, PC, national partners, NABCI partners).*
Direct habitat programs (e.g., land purchase, wetland restoration), while providing long-term security, usually cannot alone affect sufficient land area to achieve Plan goals, particularly in breeding areas where birds are dispersed. Many JVs are thus relying increasingly on public policy initiatives and work with agricultural and forestry producers to achieve their conservation objectives. Despite their presumed importance, few such initiatives have been evaluated with regard to biological impact and few have well-developed performance metrics. This focus on policy instruments also is creating new demands for social, economic, and more varied ecological information than in the past, and most JVs are just beginning to address these needs.

13) ***Programs that lead to long-term protection or restoration of natural wetland systems should continue to play a major role in meeting waterfowl needs.*** *(Responsibility = JVs with government partners, NGOs).*

a. For non-breeding areas, such acquisition or easement programs should be delivered at a scale that ultimately reduces Plan reliance on unprotected agricultural habitats and increases the amount of protected foraging habitat available to waterfowl. A few JVs (e.g., CVJV) have developed specific objectives around reducing reliance on agricultural habitats, and other partnerships should attempt to do the same.

b. For breeding areas, increasing the scale of perpetual easement programs for intact wetland systems should be a priority. Even though Plan partners cannot buy enough land to achieve their conservation visions, some investment in land gives

Plan partners clear standing as stakeholders in these vital ecosystems and should complement efforts in extension and public policy. Policy efforts that maintain or increase funding for such programs also should be a priority for Plan partners.

14) ***NAWMP partners should continue to promote farming practices that are economically appealing to producers and benefit waterfowl.*** *(Responsibility = JVs)*
Notwithstanding point 13 above, agricultural habitats will remain important for meeting the nutritional needs of non-breeding waterfowl in many JVs. On the breeding grounds, the need to affect the productive capacity of large landscapes makes it essential that Plan partners work effectively with other users of the land. Extension programs that positively affect both duck production and farm income are needed. Programs that advocate winter cereals in an annual crop rotation, and incentive payments that recognize the ecological goods and services that are provided by conservation-minded landowners are two such examples.

15) ***Maintaining or strengthening conservation provisions of the U.S. Farm Bill is crucial for both breeding and non-breeding JVs. Of similar importance should be expansion and further development of wildlife friendly farm policies in Canada.*** *(Responsibility = JVs with PC and NGO partners)*
Efforts that maintain CRP on the U.S. prairies should be a high priority for Plan partners. Even partial loss of CRP in the U.S. PPR will reverse net gains in upland cover that have occurred since 1986. Outright loss of CRP would reduce grassland habitat to a level never before seen across the U.S. prairies. In Canada, strengthening the conservation provisions of the federal/provincial Agricultural Policy Framework is a priority.

16) ***Enhancing policy and legislative protection for wetlands should be a major priority in Canada, the U.S. and Mexico.*** *(Responsibility = JVs with PC and NGO partners)*
Multiple levels of government promulgate policies that affect wetlands and all need to be lobbied for waterfowl friendly actions. As one example, the decision to reduce Section 404 (of the U.S, Clean Water Act) protection for isolated wetlands has left many wetlands susceptible to loss. Plan partners should seek to have protection for isolated wetlands restored.

17) ***Plan partners should promote policy disincentives for converting native grassland to cropland in the U.S. and Canadian Prairies***. *(Responsibility = JVs with PC and NGO partners)*
Changes in crop genetics, cropping practices, bio-fuel production, climate, and policy frameworks all contribute to increasing pressure on native grassland. Easement programs that permanently protect native grassland presently cannot keep pace with current rates of grassland conversion.

18) ***Plan partners should be actively involved in policy decisions that affect wetland water supplies for wildlife.*** *(Responsibility = JVs with national partners, NGO partners)*
Decisions that govern the distribution and pricing of water are becoming increasingly important to wetland managers in many non-breeding areas, but particularly in the semi-

arid West. In the future, freshwater is likely to become even more limiting to management options.

D. DESIRED OUTCOME 5: THE RELATIONSHIPS AMONG THE KEY INSTITUTIONAL COMPONENTS OF NAWMP (PC, NSST, JVS, NAWC COUNCILS, AND FLYWAY COUNCILS) ARE RENEWED, STRENGTHENED AND CLARIFIED IN ORDER TO HELP ACHIEVE PLAN GOALS.

19) ***The PC needs to exercise greater and more visible leadership within and beyond the Plan Community, and more active management of Plan functions.*** *(Responsibility = PC)*
The PC should build upon its functions as described in the 2004 Update (see Appendix G below) and strengthen these through renewed dialogue with the JVs and other stakeholders. The JVs want more interaction and integration between themselves and the PC, NSST, and Flyway Councils.

20) ***The PC should advocate that waterfowl harvest and habitat managers develop a coherent and coordinated approach for setting and achieving Plan objectives.*** *(Responsibility = Federal agencies with Flyway Councils and PC)*
Waterfowl managers should commit to both continuing joint technical developments (begun by the JTG) and new policy-level discussions around population objectives. Presently, there is no forum or administrative body charged to advance such policy discussions – one will need to be created and empowered to reach consensus on future objectives.

21) ***The NSST should be revitalized to tackle several follow-on assignments from this assessment and from the parallel Joint Task Group on NAWMP population objectives*** **(see sections IV A and D).** ***The NSST also needs greater human and financial resources to advance its work. Plan partners collectively must accomplish this.*** *(Responsibility = PC with national secretariats, national partners, and NSST).* There is nearly universal support in the Plan Community for enhancing the mandate and the capacity of the NSST and a desire that the NSST be an active, functioning, technical arm of the PC. Coordination and meeting support are available to some degree, but additional support is required to fund (at minimum) short-term analytical work that the NSST might commission, or (more optimally) a small group of high-caliber scientists dedicated to continuous scientific support of NAWMP.

22) ***The 2005-2006 Assessment experience has been extremely positive for the Plan Community and ought to be repeated periodically.*** *(Responsibility = PC)*
The Plan Community should consider a two-stage process wherein NSST and JV representatives report annually on biological progress to the PC and the JVs, and that every 5-10 years a more formal review panel be commissioned to complete a broader comprehensive assessment of progress – much like this current assessment. In addition, we urge the JVs to undertake periodic independent peer review of their biological foundations and conservation strategies in the normal course of their program planning.

23) ***The species and habitat JVs should communicate more and better integrate their missions.*** *(Responsibility = JVs and PC)*
Synergy among these JVs is emerging, but we think there is much more to be gained. Stronger linkages with the Flyway technical sections would also be advantageous.

24) ***In order to revitalize communications and strengthen accountability within the Plan Community, the federal secretariats in our three countries should become more thoroughly and continuously engaged in NAWMP business.*** *(Responsibility = Federal lead agencies)*
It appears to us that over time, with the addition of NAWCA and NABCI responsibilities to these offices, attention to NAWMP coordination functions has diminished.

25) ***The PC and its JVs must maintain a strong dialogue with the NAWCA Councils around the needs of NAWMP****. (Responsibility = PC with JVs and NAWCC)*
U.S. federal support through NAWCA and non-federal matching funds remain critical to conservation progress under NAWMP in Canada, Mexico and the U.S. At the same time, sideboards on the use of NAWCA funds can limit their utility to Plan partners. A strong dialogue among NAWMP stakeholders is needed to ensure continuing complementarity of these essential continental efforts.

26) ***Simultaneously, it is vital for the NAWMP partners to find new, substantive, complementary sources of financial support for Plan programs that are presently not NAWCA-eligible but critical for achieving NAWMP objectives.*** *(Responsibility = PC, JVs, and individual Plan partners)*

27) ***The Plan Community should continually strive to engage more stakeholders in NAWMP.*** *(Responsibility = JVs with PC, and FWCs)*
The JV business model for NAWMP conservation delivery has been a great success. Strong and expanding partnerships have been a key factor in this and should continue to propel NAWMP forward. It is also vital that the JV partners develop additional sources of funding to help achieve their all-bird goals while not compromising support for waterfowl conservation

NAWMP is a great success story in the long history of waterfowl conservation. Yet Plan partners recognize that there are many ways in which it can be and must be improved to realize the long-term vision of abundant and sustainable waterfowl populations. This assessment was a bold undertaking of self-examination by the entire Plan Community. We now owe it to all our stakeholders, our predecessors, our successors, and the birds to do our very best to implement these recommendations and achieve the NAWMP dream.

VI. APPENDICES

APPENDIX A. THE NAWMP ASSESSMENT STEERING COMMITTEE MEMBERS

CANADA

Dr. Ken Abraham, Waterfowl & Wetlands Research Scientist, Ontario Ministry of Natural Resources, Peterborough, Ontario

Dr. Mike Anderson, Director, Institute for Wetland and Waterfowl Research, Ducks Unlimited Canada, Stonewall, Manitoba

Dr. Bob Clark, Research Scientist, Prairie & Northern Wildlife Research Center, Environment Canada, and Adjunct Professor, Department of Biology, University of Saskatchewan, Saskatoon

Mr. Lorne Colpitts, Chief Executive Officer, Manitoba Habitat Heritage /Corporation, Winnipeg, Manitoba

Dr. Eric Reed, Population Analyst, Canadian Wildlife Service, Gatineau, Quebec

MEXICO

Mr. Humberto Berlanga, Coordinator, North American Bird Conservation Initiative, Direccion General de Vida Silvestre- CONABIO, Instituto Nacional de Ecologia- SEMARNAT, Pargues del Pedregal C.P. 10410, Mexico

Mr. Eduardo Carrera, Director of Operations, Ducks Unlimited de Mexico, Monterrey, Mexico

Mr. Arial Rojo, Director, DGVS, SEMARNAT, Mexico City, Mexico

UNITED STATES

Mr. Richard Bishop, Wildlife Bureau Chief (Retired), Iowa Department of Natural Resources, Des Moines, Iowa and Plan Committee Member

Dr. John Eadie, Professor, Wildlife, Fisheries, and Conservation Biology, University of California, Davis.

Dr. Mark Petrie, Director for Conservation Planning, Ducks Unlimited Inc., Vancouver, Washington

Dr. Frank Rohwer, Professor, School of Renewable Natural Resources, Louisiana State University, Baton Rouge, Louisiana and Scientific Director, Delta Waterfowl Foundation

Dr. Mike Tome, Regional Supervisor, Cooperative Research Unit Program, U.S. Geological Survey, Kearneysville, West Virginia

EX OFFICIO MEMBERS

Mr. David Smith, Chief, Division of Bird Habitat Conservation, Coordinator of the North American Wetlands Conservation Council, and Co-Chair NAWMP Committee.
U. S. Fish and Wildlife Service, Arlington, Virginia

Dr. Steve Wendt, Chief, Migratory Birds Conservation, Canadian Wildlife Service, Hull, Quebec

ASSESSMENT COORDINATOR

Mr. David Paullin, U.S. Fish and Wildlife Service (Retired), Sheridan, Wyoming

APPENDIX B. ACRONYMNS USED IN THIS REPORT

ACJV	Atlantic Coast Joint Venture
AFWA	Association of Fish and Wildlife Agencies
AGJV	Arctic Goose Joint Venture
AHM	Adaptive Harvest Management
AJVMB	Association of Joint Venture Management Boards
ASC	Assessment Steering Committee
BCR	Bird Conservation Region
BDJV	Black Duck Joint Venture
CET	Continental Evaluation Team
CONABIO	National Commission for Knowledge and Use of Biodiversity
CONANP	National Commission of Natural Protected Areas
CRP	Conservation Reserve Program
CVJV	Central Valley Joint Venture
CWS	Canadian Wildlife Service
EGS	Ecological Goods and Services
EHJV	Eastern Habitat Joint Venture
ESA	Endangered Species Act
FWC	Flyway Council
GCJV	Gulf Coast Joint Venture
GIS	Geographic Information System
IWJV	Intermountain West Joint Venture
JTG	Joint Task Group
JVs	Joint Ventures
LMVJV	Lower Mississippi Valley Joint Venture
MBCF	Migratory Bird Conservation Fund
NABCI	North American Bird Conservation Initiative
NAWCC	North American Wetlands Conservation Council
NAWCA	North American Wetlands Conservation Act
NAWMP	North American Waterfowl Management Plan
NGO	Non-governmental organization
NSST	North American Waterfowl Management Plan Science Support Team
NWI	National Wetlands Inventory
PAG	Pintail Action Group
PC	Plan Committee
PCJV	Pacific Coast JV
PHJV	Prairie Habitat Joint Venture
Plan	The North American Waterfowl Management

	Plan
PLJV	Playa Lakes Joint Venture
PPJV	Prairie Pothole Joint Venture
PPR	Prairie Pothole Region
RBJV	Rainwater Basin Joint Venture
SEMARNAT	Secretary of Environment and Natural Resources
SDJV	Sea Duck Joint Venture
SUMA	System of UMA's (Mexico)
UMA	Conservation Wildlife Management Unit (Mexico)
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WAFWA	Western Association of Fish and Wildlife Agencies
WBF	Western Boreal Forest
WBPHS	Waterfowl Breeding Population and Habitat Survey
WCR	Waterfowl Conservation Region
WPM	Waterfowl Productivity Model
WRP	Wetland Reserve Program

2513

APPENDIX C. NORTH AMERICAN WETLANDS CONSERVATION ACT FUNDING BY JOINT VENTURE 1986-2006 [1].

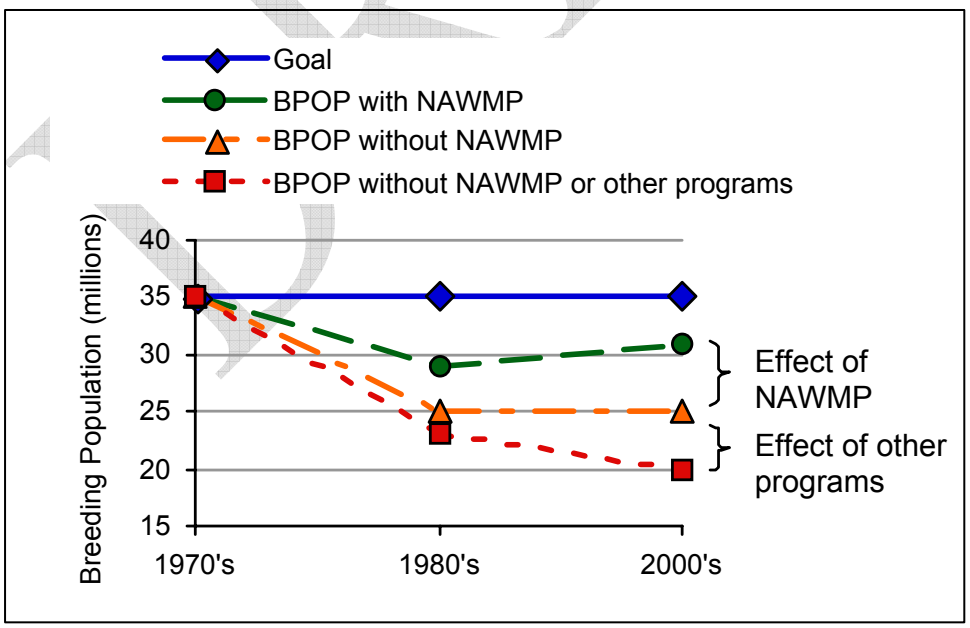
JOINT VENTURE	NAWCA DOLLARS	US NON-FEDERAL MATCH
UNITED STATES		
PRAIRIE POTHOLE	59,869,552	92,221,671
ATLANTIC COAST	108,138,477	375,503,223
GULF COAST	38,331,458	97,666,192
LOWER MISS. VALLEY	35,616,314	88,182,105
UPPER MISS./GREAT LAKES	69,622,524	183,100,927
PLAYA LAKES	14,062,954	28,181,953
CENTRAL VALLEY	35,220,125	77,657,079
PACIFIC COAST, U.S.	35,400,000	88,126,920
RAINWATER BASIN	3,824,870	5,242,833
INTERMOUNTAIN WEST	35,261,681	109,570,562
NORTHERN GREAT PLAINS	2,364,853,	4,750,778
CENTRAL HARDWOODS	0	0
SONORAN	1,453,326	2,567,777
CANADA		
CANADIAN INTERMOUNTAIN	448,510	448,510
CANADIAN INTERMOUNTAIN & PACIFIC COAST	5,342,512	5,342,512
EASTERN HABITAT	48,940,83	49,096,101
PACIFIC COAST, CANADA	15,834,615	15,834,615
PRAIRIE HABITAT	191,203,223	191,460,441
WESTERN BOREAL FOREST	7,317,745	7,317,745
MEXICO	25,714,441	38,053,056

[1]This table does not include U.S. federal non-match or Canadian contributions,

APPENDIX D. DISTINGUISHING EFFECTS VERSUS SUCCESS OF NAWMP IN REACHING POPULATION GOALS

There is often confusion over the question of whether NAWMP has had an effect on North American waterfowl populations versus whether NAWMP has been successful. We need to clarify these terms. Success is an absolute measure; i.e., average waterfowl populations are restored to, and maintained at, the 1970's average, and this is not simply *via* a string of exceptionally wet years. Effect is a measure of the extent to which NAWMP efforts have contributed to that success. NAWMP efforts could have, indeed, improved conditions for waterfowl relative to what would have been the case had NAWMP not been in place. However, such a positive effect would not mean that NAWMP has been successful if goals have not yet been reached.

The figure below illustrates this point. NAWMP goals are approximately 35 million ducks (1970's average). Certainly there has been variation in duck numbers (low in 80's, high in 90's, back down in 2000's). The question is where would we have been throughout this period without NAWMP? A hypothetical situation is shown below. The blue line (diamonds) indicates the static NAWMP goal. The red line (squares) is a hypothetical duck population without NAWMP and without other programs that contribute indirectly to waterfowl habitat and populations (e.g., changes in agricultural policy). The orange line (triangles) is a population without NAWMP but with other programs in place. Finally, the green line (circles) is the observed breeding population with NAWMP (and other efforts). To determine whether NAWMP has had an effect, we need to compare the change in breeding populations with NAWMP versus that without NAWMP (green vs. orange lines).



Clearly, NAWMP could have had significant effects on waterfowl populations. However, does this mean NAWMP has been successful? In the hypothetical case illustrated here, the answer is

no, if we define success as meeting and maintaining 1970's population goals. Success would be achieved only if observed populations (green circles) reached NAWMP goals (and this was not simply due to weather or precipitation). A measure of the effect of NAWMP is the difference between populations without NAWMP (orange triangles) and populations with NAWMP (green circles).

The inherent problem in evaluating NAWMP at a continental level is we do not know what the population of ducks would have been without NAWMP. We can only measure the current breeding population with NAWMP in place (green circles) and evaluate that relative to the desired goal (blue diamonds). Moreover, even if duck populations do reach goal levels, we can't be sure how much of that increase is due to NAWMP versus other influences or programs. For example, changes in agricultural policy (e.g. CRP) can contribute substantially to achieving the Plan population goals (illustrated in the figure as the difference between the line with orange triangles and the line with the red squares). The extent to which Plan partners can take credit for such achievements is debatable. Nonetheless, it is clear that even if direct NAWMP efforts have considerable effect, success may depend critically on the accomplishments achieved *via* these other programs.

Our challenge, in evaluating the effectiveness of Plan efforts, is to disentangle the direct accomplishments of Plan partners from those attributable to other influences. We have suggested throughout this report that such an evaluation will only be possible when three fundamental elements are in place:

(1) a robust measure of landscape change;
(2) an ability to determine the extent to which these changes have resulted from NAWMP efforts; and
(3) sound biological models to relate landscape changes to population metrics (populations size, vital rates).

APPENDIX E. TRENDS OF WATERFOWL POPULATIONS COVERED UNDER THE NORTH AMERICAN WATERFOWL MANAGEMENT PLAN, 1970-2003[k]

NOTE TO REVIEWERS: APPENDIX E IS CURRENTLY UNDER CONSTRUCTION. UPON COMPLETION THIS APPENDIX WILL BE POSTED ON THE INTERNET AS PART OF THE PUBLIC REVIEW DOCUMENT.

Species/ Subspecies/Population[b]	Long-Term Trend (1970– 2003)	Population Objective	Limiting Factors Identified	Habitat Conservation Actions Taken
MALLARD[k]	No trend	Yes		
Mexican subspecies[d]	Increasing[e]	No		
NORTHERN PINTAIL[k]	Decreasing	Yes		
AMERICAN BLACK DUCK	Decreasing[e]	Yes		
MOTTLED DUCK	No trend[e]			
Florida subspecies[d]	Increasing[g]	Yes		
Western Gulf Coast subspecies	No trend[e]	No		
GADWALL[k]	Increasing	Yes		
AMERICAN WIGEON[k]	Decreasing	Yes		
GREEN-WINGED TEAL[k]	Increasing	Yes		
BLUE-WINGED AND CINNAMON TEAL	No trend			
Blue-winged teal[k]	Increasing	No		
Cinnamon teal	No trend[e]	No		
NORTHERN SHOVELER[k]	Increasing	Yes		
HAWAIIAN DUCK[d]	No trend	Yes		
LAYSAN DUCK[d]	No trend	Yes		
WHITE-CHEEKED PINTAIL[d]	No trend	No		
WOOD DUCK	Increasing[e]			
Eastern population	Increasing[e]	No		
Western population	Increasing[e]	No		
MUSCOVY DUCK[d]	Decreasing[e]	No		
WHISTLING DUCKS	Increasing[e]			
Fulvous whistling duck	Increasing[e]	No		
Black-bellied whistling duck	Increasing[e]	No		
West Indian whistling duck[d]	Unknown	No		
REDHEAD[k]	No trend	Yes		

CANVASBACK[k]	Increasing	Yes		
SCAUP	Decreasing			
Lesser scaup[k]	Decreasing[e]	No		
Greater scaup[k]	Increasing	No		
RING-NECKED DUCK	Increasing	No		
RUDDY DUCK	Increasing			
West Indian subspecies[d]	Increasing	No		
Continental subspecies	Increasing	No		
MASKED DUCK[d]	Unknown	No		
HARLEQUIN DUCK	No trend[e]			
Eastern population	No trend[e]	No		
Western population	No trend[e]	No		
LONG-TAILED DUCK	Decreasing[e]	No		
EIDERS	Decreasing[e]			
King eider	Decreasing[e]	No		
Common eider	Decreasing[e]	No		
American subspecies	No trend[e]	No		
Northern subspecies[d]	Decreasing[e]	No		
Hudson Bay subspecies[d]	Decreasing[e]	No		
Pacific subspecies	Decreasing[e]	No		
Steller's eider[d]	Decreasing[e]	No		
Spectacled eider[d]	Decreasing	No		
SCOTERS	Decreasing			
Black scoter	Decreasing[e]	No		
Surf scoter	Decreasing[e]	No		
White-wing scoter	Decreasing[e]	No		
GOLDENEYES	No trend			
Common goldeneye	No trend	No		
Barrow's goldeneye	No trend[e]	No		
Eastern population	No trend[e]	No		
Western population	No trend[e]	No		
BUFFLEHEAD	Increasing	No		
MERGANSERS	Increasing			
Hooded merganser	Increasing[e]	No		
Red-breasted merganser	Increasing[e]	No		
Common merganser	Increasing[e]	No		

[a] Traditional Survey Area estimates were derived from the Waterfowl Breeding Population and Habitat Survey (WBPHS), strata 1-18, 20-50, 75-77. Other Surveyed Area estimates were derived from some combination of WBPHS strata (51-57, 62-69), the Breeding Waterfowl Plot Survey also conducted in eastern Canada, and concurrent state, provincial, or regional breeding waterfowl surveys in British Columbia, California, Colorado, Connecticut, Delaware, Florida, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Nebraska, Nevada, New Hampshire, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Utah, Vermont, Virginia, Washington, Wisconsin, and Wyoming. In cases where a survey was not completed every year between 1993 and 2002, or when data were unavailable, mean estimates were computed by using available estimates for that time period. Continental estimates include the surveyed area estimates as well as rough estimates of populations outside

of surveyed areas based on harvest derivation studies, expert opinion, winter survey data, or special purpose research surveys. Continental estimates for species such as the muscovy, whistling ducks, masked duck, and many sea ducks are based on few data and are particularly speculative.

[b] Subpopulations are identified distinctly when there is significant evidence for allopatry. Subspecies are also distinguished according to current taxonomic classification. The taxonomic delineation presented in this table is intended to aid in development of regional habitat conservation strategies and is not intended to supercede other international agreements regarding the appropriate organizational level for species management.

[c] An entry of "Not differentiated" in these fields indicates that the survey protocol does not enable discrimination to a particular taxonomic level. "Not applicable" indicates that the species, subspecies, or subpopulation is not recorded in the WBPHS Traditional Survey Area or in the surveys represented by the "Other Surveyed Area" category.

[d] Not shared among two or more signatory nations. Management is the responsibility of that nation whose boundary coincides with the range of the species, subpopulation, or subspecies.

[e] Trend assessments are based on data sources (e.g., Mid-winter Survey, Breeding Bird Survey, published accounts) other than breeding population estimates from the WBPHS. In general, less confidence is attributed to these values.

[f] 1993-2001.

[g] 1994-2000.

[h] Winter population.

[i] Data available from Puerto Rico only.

[j] Estimate of lesser scaup in the traditional survey area was computed from nontundra WBPHS strata 1-7, 12, 14-18, 20-50, 75-75. Estimate of greater scaup in the traditional survey area was computed from tundra strata 8-11 and 13. These can be considered only crude estimates since some mixing of lesser and greater scaup occurs in tundra and northern boreal strata.

[k] Includes updated trend data for 2004-2006.

Species/population	Population Trend (1994-2003)[b]	Population Objective	Limiting Factors Identified	Conservation Actions Taken
CANADA GOOSE				
Atlantic	Increasing	Yes		
Atlantic Flyway Resident	Increasing	Yes		
North Atlantic	No estimate	No		
Southern James Bay	No trend	Yes		
Mississippi Valley	No trend	Yes		
Mississippi Flyway Giants	Increasing	Yes		
Eastern Prairie	No trend	Yes		
Western Prairie and Great Plains	Increasing	Yes		
Tall Grass Prairie	No trend	Yes		
Short Grass Prairie	Decreasing	Yes		
Hi-Line	Increasing	Yes		
Rocky Mountain	Increasing	Yes		
Pacific	No estimate[h]	No		
Lesser	No estimate	No		
Dusky	Increasing[j]	Avoid ESA[k] listing (??)		

Cackling	No trend	Yes
Aleutian	Increasing	Yes
Vancouver	No estimate	No
Taverner's	No estimate	No
SNOW GOOSE		
Greater	No trend[m]	No
Mid-continent lesser	No trend[m]	Yes
Western Central Flyway lesser	No trend[m]	Yes
Wrangel Island lesser	Increasing	Yes
Western Arctic lesser	Increasing	Yes
ROSS'S GEESE	Increasing	Yes
WHITE-FRONTED GOOSE		
Mid-continent	No trend[m]	Yes
Tule	No trend	Yes
Pacific	Increasing	Yes
BRANT		
Atlantic	No trend	Yes
Pacific	No trend	Yes
Western High Arctic	No estimate	Yes
Eastern High Arctic[n]	No trend	No
EMPEROR GEESE[n]	No trend	Yes
HAWAIIAN GEESE[n]	No trend	Yes

[a] Incomplete survey years were excluded from the computation. Where no estimates are available for 2001-2003, the most recent estimate is presented.

[b] Many goose population surveys, particularly breeding ground surveys, have shorter periods of record than surveys established for ducks. For this reason trend estimates are based on a shorter, 10-year, interval, or for the period of record when 10 years of data are not available.

[c] Breeding pair index.

[d] Objective partitioned: 150,000 pairs Ungava Peninsula; 25,000 pairs boreal Quebec. The 3-year mean population of 156,200 presented for this population refers to that portion of the population breeding on the Ungava Peninsula.

[e] Total spring population.

[f] Reduce to this level by 2005.

[g] Winter population.

[h] State and provincial surveys exist but it is not yet possible to develop a population-wide index.

[i] Population estimates based on neck collar observations during the winter.

[j] Official estimates of population size from neck collar data show an increasing trend; however, direct counts of breeding population size in Alaska remain depressed with no indication of positive trend.

[k] ESA – Endangered Species Act (United States).

[l] Autumn population.

[m] Ten-year trends may mask shorter-term trends in this population.

[n] Not shared among two or more signatory nations. Management is the responsibility of the nation which encompasses the range of the species or population.

Species and Population	Recent Trend (1994-2003)[a]	Population Objective	Limiting Factors Identified	Conservation Actions Taken
TUNDRA SWANS				
Eastern Population	Increasing	Yes		
Western Population	No trend	Yes		
TRUMPETER SWANS				
Pacific Coast Population	Increasing[d]	Yes		
Rocky Mountain Population	Increasing[d]	5% annual growth rate[g]		
Interior Population	Increasing[d]	Yes		
MUTE SWANS	Increasing[h]	No		

[a] Swan population surveys have shorter periods of record than surveys established for ducks. For this reason trend estimates are based on a shorter (10-year) interval or for the period of record when 10 years of data are not available.

[b] Winter population.

[c] 2000 Index from the North American Trumpeter Swan Survey conducted every 5 years.

[d] 1990-2000.

[e] Autumn population.

[f] Average annual growth rate 1995-2000.

[g] Interim objective specified until an abundance objective is adopted.

[h] Based on the Atlantic Flyway Mute Swan Mid-Summer Survey and individual state survey data from the Mississippi, Central, and Pacific Flyways.

APPENDIX F. CHARACTERISTICS OF EFFECTIVE JOINT VENTURES

Throughout the assessment process, the wide range of approaches, strengths and styles of the different JVs became very apparent. Indeed, this remarkable diversity provides a core strength of the JV model – innovation and ideas are developed and implemented locally by partners with a thorough understanding of the nuances, challenges and opportunities specific to a region. This has been an extraordinarily successful model and we recognize the need to respect and maintain the diverse approaches that individual JVs have adopted.

We observed further that key elements or characteristics of JVs have enabled some to be particularly effective. Here, we highlight some common elements that typify effective JVs. No single JV exemplifies all of these characteristics – there is no single recipe for success, nor should there be. Nonetheless, we have observed that JVs that exhibit few of these key elements have often struggled in "getting-off-the-ground" and have not become as effective as desired. We offer the following recommendations to guide JVs as they evaluate their own working models and to learn and adapt from other successful JVs.

Recommendations:

Commitment & Responsibilities

All major JV partners should make a formal commitment to the JV Strategic and Implementation Plans by signing them. Roles and responsibilities of each partner should be clearly spelled out. Some JVs have developed written Planning Principles to define partner roles; this approach could serve as a model for other JVs to follow.

Technical Committee

All JVs should have a waterfowl technical committee that is functional and meets on a regular basis. The technical committee should include representatives of the appropriate Flyway technical committee, state, provincial, and federal waterfowl biologists, habitat-based biologists, NGO biologists, and research biologists.

Strong ties between Management Board and Technical Committee

Commitment by Management to support objective program planning, and monitoring and evaluation of program effectiveness is fundamental to JV success. Frequent communication and other interactions between management and science arms will help maintain support for monitoring and evaluation (e.g., by demonstrating that uncertainty in decision-making can be reduced) and thus create a program that is more responsive to changing environmental and socioeconomic conditions.

Policy Expertise

Policy expertise should be considered on JV committees, especially where policy is key to producing/maintaining landscapes of importance to waterfowl. Some JVs have established a separate Policy Committee.

Science Advisor

All JVs should have a full time staff person to serve as a science advisor in addition to a full time JV Coordinator. The science advisor should have a strong background in waterfowl/wetlands ecology and management. JVs have incorporated all-bird conservation planning in various ways. Success involves drawing on state, provincial, federal and NGO expertise with other avian groups and habitats. As JVs move to all-bird conservation, relevant expertise should be sought and integrated into technical committees.

Biologically-based Planning

A few JVs stand out because of their strong science basis for planning. All JVs should have a sound biological framework to guide implementation; this framework should be articulated clearly in each JV Implementation Plan. Planning models should be developed to identify implementation actions needed to address critical habitat-related limiting factors for regional waterfowl populations. Highly successful JVs continuously test their models and assumptions, and update their plans in response to new information.

Prioritization

It is essential that implementation objectives are prioritized (i.e., identifying what needs to be done first, where and why). These priorities must be based on sound biological planning and their rationale should be stated clearly in the JV Implementation Plan. Planning priorities should be reviewed at regular intervals. Purely opportunistic conservation efforts should be discouraged.

Monitoring and Evaluation

JVs should establish explicit monitoring, evaluation, and research priorities. These should be reviewed on a regular basis to ensure they address key assumptions, uncertainties and implementation efforts. Some JVs maintain an Information Matrix that is regularly updated to incorporate new information, remove completed items and re-order priorities. Other JVs have developed focused teams dedicated to particular regions or initiative areas within the JV to undertake planning, monitoring and evaluation for each area. Monitoring and Evaluation of implementation methods/activities and development of research priorities should be an integral part of the waterfowl technical committee's oversight responsibilities.

Formal and Regular Updating Process

JVs should update key documents on a set cycle (recommended every 5 years). External peer review should be used more as JV planning documents are developed, revised and updated. The NSST and JV coordinators who have been successful in implementing sound biological models for planning could serve as valuable peer reviewers to guide the development of similar planning models for other JVs.

Communication

All JVs should have a Communication Plan. Many JVs maintain a website as their primary communication method. Some JVs have hired communication specialists to ensure that the JV is effectively reaching potential partners and supporters.

Additional examples

In addition to the characteristics of effective JVs outlined above, we discovered many other innovative approaches used by JVs to accomplish their goals. In the interest of sharing lessons learned among JVs we summarize some of these below. Our sole intent is to highlight observations obtained in the course of some of our assessments that are worth sharing with other JVs as they adapt and modify their own working models.

- The PHJV has successfully sponsored periodic Science and Policy Forums as a way to encourage the lateral flow of information throughout the Plan Community.

- The AGJV and the SDJV recently cooperated on a survey project that was mutually beneficial to both. Perhaps this could be used as a model for cooperation between two JVs.

- The AGJV and the ACJV have especially strong ties to Flyways, providing a good example of close cooperation between JVs and Flyways.

- The AGJV has done an outstanding job of publishing technical information in their specialty field and similar approaches might benefit other JVs where technical issues must be developed clearly for JV partners and public supporters.

- The PHJV is developing a scientific model and staff handbook for field level managers to enhance opportunities for NAWMP to be more beneficial to other bird groups. Similar handbooks could be of use in other JVs.

- The PHJV has developed the Waterfowl Productivity Model (WPM) that links landscape and habitat-specific information to hatching success of 5 common dabbling duck species in the Canadian PPR. A similar approach might be beneficial for other breeding ground JVs.

- The RBJV Great Plains GIS Partnership was formed in conjunction with the PLJV and other partners and provides a particularly innovative and successful approach to collaboratively meeting their GIS needs.

- The PLJV is a private non-profit 501 C3 corporation built on a business model. We could not ascertain if this arrangement is more effective or efficient but this model could possibly be used by other JV's as an alternative approach to administration.

- In the PLJV, each board member's organization pays $5K annually for 5 years to support lobbying trips to Capitol Hill and other administrative support needs of the JV. It was noted this has been very successful in bringing issues of critical interest to the JV to the attention of policy makers.

- Some JVs have BCR coordinators (e.g. ACJV) and this may be worth considering in JVs with multiple BCRs and those undertaking extensive all-bird planning.

- A few JVs stand out (e.g., PLJV, IWJV, and ACJV) as good examples of how to integrate BCR and other bird initiative plans into existing NAWMP delivery frameworks.

- We were particularly impressed with the IWJV's innovative Cost Share Program in terms of how it is structured, advertised, and managed.

- The IWJV has invested much time with IAFWA and WAFWA, attending their meetings and hosting luncheons through their NGO partners to build working relationships and lines of communication and cooperation.

- We noted that the RBJV efforts at "friend raising" not fund raising, were impressive and could provide a good approach for newly developing JV partnerships.

- The RBJV has 4 landowners on its management board. This is a novel approach to encourage greater participation and feedback from the local community.

- The Private Lands Working Group developed by the RBJV is viewed as being a particularly effective and noteworthy approach to working closely with private landowners.

- The RBJV has used two retired farmers rather than traditional biologists to deliver private lands conservation and has had great success.

- The PCJV (Canada) did a particularly good job of prioritizing 440 estuaries along a complex 27,700 km coastline in BC. This could provide a model to develop prioritization plans for other JVs with similar habitats.

- We viewed the BC Lands Forum (PCJV Canada) as a particularly good model for coordinating land conservation efforts of many groups over a large landscape

- Many JVs have identified keystone species (e.g. GCJV) to help them market and focus their work. The concept of using keystone species to champion JV efforts merits further consideration.

- The LMVJV has forged a unique working relationship with USGS to address research needs; its model of co-locating the JV coordinator and staff with key USGS research personnel could provide a new model to ensure a close link between planning, implementation and evaluation.

- The PPJV does periodic updating of its work in a unique and innovative process they call Dynamic Objective Setting.

APPENDIX G. INSTITUTIONAL, LEGAL AND ADMINISTRATIVE AUTHORITIES, FUNCTIONS AND ARRANGEMENTS[1]

Plan Committee

The North American Waterfowl Management Plan Committee is an international body that provides leadership and oversight for the activities undertaken in support of the North American Waterfowl Management Plan.

Leadership

Taking advice from all Plan partners and the North American Waterfowl Management Plan Science Support Team (NSST), the Plan Committee provides leadership and promotes synergies within the North American waterfowl community, across relevant sectors, and internationally by:

- Championing waterfowl conservation in the context of coordinated bird management.
- Enhancing communications on waterfowl conservation and coordination within North America and with other nations that share North American waterfowl.
- Continually scanning the institutional network influencing waterfowl conservation and seeking ways to foster synergy among them.
- Promoting the development and assessment of continental waterfowl population objectives and species and geographic priorities through development and distribution of the Plan document.
- Connecting with the broader scientific community and ensuring that the Plan — and the NSST —link effectively and operationally with relevant scientific authorities such as the joint venture technical committees; Flyway Councils; and federal, state, and provincial agencies.
- Serving as a forum for discussion of major, long-term, international waterfowl issues and problems, and developing those discussions into recommendations for consideration by the cooperating partners and countries.
- Directing waterfowl-related recommendations to the Canadian Wildlife Service, the U.S. Fish and Wildlife Service, and the Mexican General Directorate of Wildlife, and returning information from those agencies to the Plan Community.

Plan Management

The Plan Committee has oversight responsibility for assuring the quality of Plan actions and the overall effectiveness of the Plan. The committee also needs to be able to report on the impact of Plan funding and activities. To meet these obligations, the committee orchestrates Plan Community resources to:

[1] North American Waterfowl Management Plan, Plan Committee. 2004. North American Waterfowl Management Plan 2004. Implementation Framework: Strengthening the Biological Foundation. Canadian Wildlife Service, U.S. Fish and Wildlife Service, Secretaria de Medio Ambiente y Recursos Naturales, 106 pp.

- Review and monitor progress toward achieving the Plan's population goals and related habitat objectives.
- Update the Plan approximately every 5 years in response to new or changing circumstances, policy developments, and opportunities.
- Foster an adaptive management approach among joint ventures in conservation implementation.
- Review and endorse waterfowl conservation components of joint venture plans.
- Review implementation and evaluation strategies developed by joint venture or other regional partnerships.
- Review periodic joint venture reports to ensure joint venture activities effectively further the Plan's purposes.
- Encourage coordination and consensus among joint ventures and other relevant bodies concerning waterfowl conservation needs, biological planning, monitoring, and assessment.
- Maintain and promote strong relationships with Flyway Councils, wetland councils, the North American Bird Conservation Initiative's Trilateral Committee, and other bird initiatives.
- Host periodic conferences for the NSST, joint ventures, and Plan partners to discuss improvements to the Plan's biological foundation.
- Annually solicit JVs and other Plan partners for input on the status of Plan implementation and issues to be addressed by the Plan Committee.
- Prepare periodic reports on the status of Plan implementation for the three federal wildlife agencies using input from the joint ventures and the NSST.
- Review periodically — in the spirit of adaptive management promoted in this Update — the Plan Committee's own effectiveness and consider structural, relational, and management approaches to enhance committee impact.

Membership

The Plan Committee consists of 18 members, 6 each from Canada, the United States, and Mexico, selected from agencies responsible for waterfowl management in their respective countries and appointed by the director of their federal wildlife agencies.

NAWMP Science Support Team (NSST)

The NAWMP Science Support Team (NSST) was created in 2000 to provide technical advice to the Plan Committee. Its mission is "To help strengthen the biological foundations of the Plan, and facilitate continuous improvement of Plan conservation programs." The team provides the following major services to the Plan:

1. *Provides technical input and recommendations to the Plan Committee on Plan implementation.* The team periodically reviews Plan population objectives, species priorities, geographic priorities, and habitat objectives; provides input on Plan updates; performs technical assistance in crafting broad scale implementation strategies for the Plan; and helps interpret long-term implications of climate changes, agro economic trends, policy impacts, and other global dynamics for the future of waterfowl conservation.

2. *Facilitates identification of methods for biological planning and for evaluating Plan performance at continental and regional scales*. The NSST promotes adaptive management; assists regional Plan partnerships with stepping down continental population objectives and the development of habitat objectives; assists regional partnerships in developing a better understanding of the effects of habitat variation on population demography in order to link regional habitat objectives to continental
population objectives; and assesses Plan progress while accounting for uncontrolled environmental variation. Methodological contributions could include identifying common currencies and definitions for interjoint venture planning, and seeking standardization and integration in survey and data management protocols for habitat and population monitoring.

3. *Acts as a forum for discussions on and integration of biological planning and evaluation at multiple spatial scales*. The team helps improve the coordination of national, continental, and regional biological planning, monitoring, and assessment, as well as identifies broad-scale information gaps and technical issues beyond the scope of individual joint ventures.

4. *Facilitates technical information exchange and reporting.* The NSST helps to improve technical information exchange among joint ventures, between the Plan Committee and the joint ventures, among the Flyways and the Plan Community, and between the North American Wetlands Conservation Council(s) and the Plan Community.

5. *Helps identify and communicate data, monitoring, assessment, and research needs to U.S. Geological Survey-Biological Resources Discipline, academia, U.S. Fish and Wildlife Service, and other Plan partners and enables objective comparison of proposed evaluation activities.* It facilitates technical integration with the flyway system and other bird initiatives on issues of common interest.

6. *Reports to the Plan Committee and Plan partners on the status of Plan biological foundation, evaluation results, and implications for future conservation activities*. The Plan Committee intends to begin regular reviews of joint venture progress in attaining the regional goals and objectives of the Plan. In support of these periodic reviews, the NSST will receive, consolidate, and assess regional progress reports and make related recommendations to the Plan Committee.

Membership

The NSST consists of three national representatives appointed by the Plan Committee Co-Chairs and one technical representative from each of the joint ventures and Flyway Councils. Ad-hoc members may also be appointed by the co-chairs of the Plan Committee.

Joint Ventures

“Think Continentally; Act Locally” is one concept that led to the creation of joint ventures by Plan founders. They recognized that success could only be achieved through the collaborative efforts of a range of public and private organizations, coordinated through a continental perspective, energized by local passion, and informed by resident expertise. In Canada and the

United States, where there has been a strong history of closely coordinated conservation actions by governments and several nongovernmental organizations, formal partnerships, called "joint ventures" have been formed to help implement the Plan. Joint ventures are planning and adaptive management focal points which join diverse interests to restore and protect habitat by advocating partnerships at the local level. The biological foundation components of joint venture perspectives that deal with waterfowl population goals and related habitat objectives are sanctioned by and accountable to the Plan Committee for meeting their responsibilities. In recent years, with the planning for all bird conservation in North America, many joint ventures have adopted a structure, objectives, and operations to accommodate conservation initiatives that will foster all bird conservation.

Two types of joint ventures currently operating:

Habitat joint ventures are the fundamental regional conservation units of the Plan. They comprise diverse stakeholders committed to waterfowl conservation in a specific area, identified as one of the Plan's priority habitats. They were formed in response to research that indicated habitat loss and degradation were the causes of decline for many waterfowl species during the mid-1980s. Additional habitat joint ventures can be formed when formal partnerships for waterfowl habitat conservation develop in other areas of concern.

Species joint ventures focus on knowledge acquisition that supports management actions. Black Duck and Arctic Goose Joint Ventures were specified in the original Plan to address concerns about the status of populations, to rectify the lack of data to specify the nature of the problem, or to design management solutions. Interest in forming a Sea Duck Joint Venture began in 1998 for much the same reasons. Species joint ventures comprise agencies capable of contributing effort, talent, and financial resources toward coordinated scientific activity. Research results are fed into the planning of habitat joint ventures. Additional species joint ventures can be considered wherever a significant science need is identified, together with a proposed coalition of partners.

Joint ventures are autonomous units which subscribe to the Plan's vision and principles and implement Plan objectives, and priorities through regional and local conservation efforts. Each joint venture is overseen by its own management body, develops a strategic implementation and evaluation plan, and organizes completion of its tasks through various support committees. Habitat joint ventures "step-down" the Plan's continental population objectives to develop regional habitat objectives by using sound science enhanced with local knowledge, and an evaluation of local opportunities and conservation dynamics. A joint venture's management interventions are expected to be strategic, science-based, and molded through adaptive management. Plan Committee endorsement of a joint venture's implementation plan can greatly facilitate recruitment of various institutional, financial, and human resources to achieve habitat objectives. Joint ventures report annually to the Plan Committee and Plan partners on the status of joint venture activities, challenges, and accomplishments.

Existing joint ventures that have a waterfowl conservation component endorsed by the Plan Committee are listed below with the country and year in which they were founded:

Habitat Joint Ventures

Atlantic Coast (U.S.: 1986)
Central Valley Habitat (U.S.: 1986)
Eastern Habitat (Canada: 1986)
Gulf Coast (U.S.: 1986)
Lower Mississippi Valley (U.S.: 1986)
Prairie Habitat (Canada: 1986)
Prairie Pothole (U.S.: 1986)
Playa Lakes (U.S.: 1990)
Intermountain West (U.S.: 1992)
Pacific Coast (U.S. & Canada: 1992)
Rainwater Basin (U.S.: 1992)
Upper Mississippi River — Great Lakes Region (U.S.: 1992)
Sonoran (U.S.: 1999)
Central Hardwoods (U.S.: 2000)
San Francisco Bay (U.S.: 2000)
Northern Great Plains (U.S.: 2001)
Canadian Intermountain (Canada: 2002)

Species Joint Ventures

Arctic Goose (U.S. & Canada: 1986)
Black Duck (U.S. & Canada: 1986)
Sea Duck (U.S. & Canada: 1999)

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